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A NEW GENUS OF ISCHNOCERA (MALLOPHAGA).

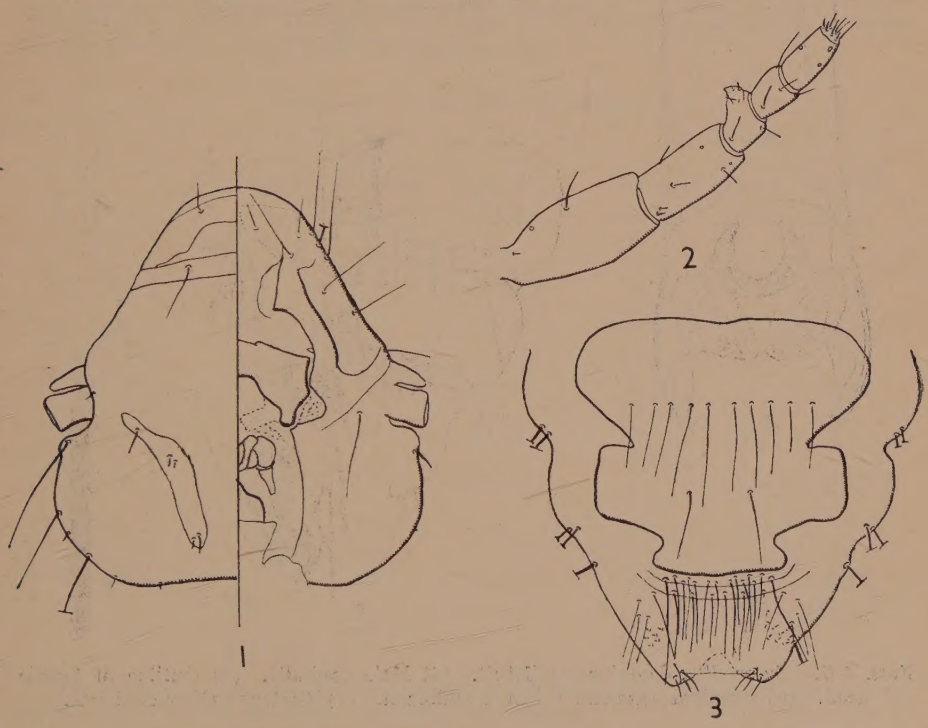
By Theresa Clay, F.R.E.S.

(*British Museum* (*Natural History*).)

While making a key to the genera and generic groups of the Ischnocera it was found that *Lipeurus docophorus* Giebel, 1874, could not be included in any of the described genera and it is, therefore, here made the type species of the following new genus.

Bucorvellus gen. n.

Ischnocera with marginal carina interrupted laterally by transverse dorsal pre-antennal suture; ventral carinae interrupted medianly, each carina with flattened internal parallel margin to which is attached a lobe of the pulvinus. Prothorax with one dorsal marginal seta each side; two central mesosternal and two, more laterally placed, metasternal setae. Abdominal terga II–VIII with posterior row of stout flattened setae (fig. 7), and, in addition, segment II has two extra rows, and segments III–VIII one extra row in the middle of the segment; there may also be one or two extra setae lying between these two rows. At least one tergum (usually more) has an irregular sclerite lying between the divided tergal plates; tergites II–VI or VII in the male and II–VIII in the female divided in the mid-line. In the male sternal plates II–IV are lateral, V–VI central and the remainder fused to form

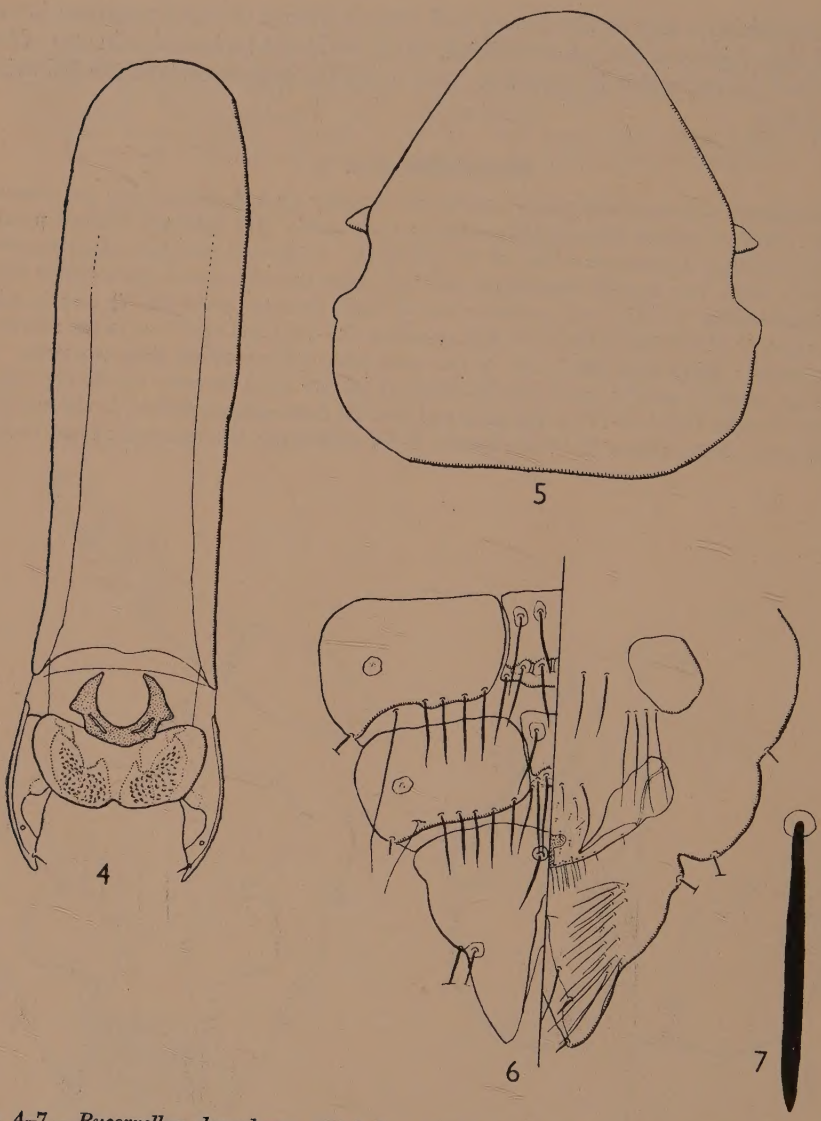


Figs. 1–3.—*Bucorvellus docophorus* (Giebel), male. (1) Head. (2) Antenna. (3) Terminal segments of abdomen, ventral.

the genital plate; in the female all the sternal plates are lateral and there is no genital plate. Posterior margin of abdomen bilobed in both sexes; male genital opening ventro-terminal; female with ventral vertical line of long stout setae each side of segment IX–X (fig. 6).

Type species: *Lipeurus docophorus* Giebel, 1874.

The gender of the genus is masculine.



FIGS. 4–7.—*Bucorvellus docophorus* (Giebel). (4) Male genitalia. (5) Outline of female head. (6) Terminal segments of female abdomen. (7) Flattened abdominal seta.

Distribution.—At the present time this genus is known from the two species of *Bucorvus* (Bucerotidae).

Affinities.—Throughout the Ischnocera the nearest affinities of a genus are usually to be found with the other genera parasitic on the same host order. Examples of this widespread rule are the related genera *Cummingsiella*, *Quadraceps*, *Lunaceps* and *Saemundssonia* on the Charadriiformes; the Ischnocera on the Procellariiformes, which, with the exception of *Saemundssonia* and *Docophoroides*, are probably all related to each other; and the *Gonoides*-complex on the Galliformes. These cases are probably the result of divergence from a single ancestral stock which became parasitic on the ancestral host stock. The affinities of *Bucorvellus* conform to this rule; this genus appearing to be most nearly related to *Paroncophorus*, also parasitic on the Bucerotidae. The relationship is shown especially by the characters of the female genital region. *Bucorvellus* can at once be distinguished from this latter genus by the characters of the head and the presence of two or more rows of stout blade-like setae on the terga. The presence of more than one row of tergal setae is rare in the Ischnocera, but is found in *Struthiolipeurus*, *Meinertzhageniella* and *Falcolipeurus*.

Bucorvellus docophorus (Giebel).

Lipeurus docophorus Giebel, 1874. *Insecta epizoa* : 214. Type host: *Buceros abyssinicus* = *Bucorvus abyssinicus* (Boddaert).

Lipeurus abyssinicus Giebel, 1874. *Insecta epizoa* : 214. Nomen novum for *L. docophorus* Giebel.

As this species has apparently never been figured[1] nor re-described, the following figures and description may be of use. In the Nitzsch manuscript there is a drawing of one of the specimens on which Giebel based his description, which shows that *L. docophorus* is the following species.

TABLE I.—*Abdominal Chaetotaxy.*[2]

	Male.			Female.		
	Tergal.	Lateral.	Sternal.	Tergal.	Lateral.	Sternal.
II. Row 1 .	6–10	0	18–22	6–10	0	18–24
,, 2 .	4	.	.	4	.	.
,, 3 .	18–20	.	.	17–26	.	.
III. Row 1 .	4	1	20–30	4	1	23–30
,, 2 .	18–25	.	.	19–26	.	.
IV. Row 1 .	4–5	1	18–24	4–5	1	22–25
,, 2 .	19–25	.	.	19–29	.	.
V. Row 1 .	4–5	1	15–20	4–5	1	18–22
,, 2 .	16–24	.	.	17–27	.	.
VI. Row 1 .	4–5	2	12–16	4	2	14–17
,, 2 .	15–19	.	.	16–26	.	.
VII. Row 1 .	4	2	9–12	4	2	7–12
,, 2 .	13–16	.	.	14–23	.	.
VIII. Row 1 .	2–4	2	2	2–4	2	.
,, 2 .	9–16	.	.	8–17	.	.
IX–X. Row 1 .	2 each side	1–2	fig. 3	2–3	1	13–17 each side
,, 2 .	1 each side	2–3	.	1	1	.

[1] Since going to press Taschenberg's figures (1882, *Nova Acta Leop.-Carol.*, pl. 4, fig. 5) of the original Nitzsch specimens have been remembered.

[2] Post spiracular setae omitted. Sternite II has two irregular rows here counted as one. Sternal setae of IX–XI in male as in fig. 3.

Male.—Head as in fig. 1. Thorax with general shape as in Pl. I, fig. 1; prothorax with one dorsal seta each side of posterior margin reaching to level of base of third leg; pterothorax with group of five, mainly long stout setae each side of posterior margin, the longest reaching to segment V; two central mesosternal and two, more laterally placed, metasternal setae. Tergal and sternal plates as described for the genus; there is considerable variation in the presence or absence and extent of the sclerites lying between the tergal plates. Tergal plate VII may be entire or divided medianly. Post-spiracular setae present on segments II–VIII and with adjacent sensilli (*see* Clay, 1954 : 716) on segments II–V; the post-spiracular setae on segments II–V and VIII long and fine, those on VI and VII long and stout. Most of the rest of the abdominal setae are stout and flattened (fig. 7) with some variation in number (see Table I). Genital region and genitalia as shown in figs. 3 and 4.

Female.—Shape of head as in fig. 5, chaetotaxy as in male; antennae simple. Shape of thorax as shown in Pl. 1 fig. 2, chaetotaxy as in male. Abdomen with general characters as in Pl. I, fig. 2; tergal and sternal plates as described for genus. Post-spiracular setae as in male; see Table I for rest of abdominal chaetotaxy. Genital region as in fig. 6.

TABLE II.—*Measurements in mm.*

Males.

	Length.			Breadth.	
	Range.	Mean.		Range.	Mean.
Head (5) . .	0·77–0·87	0·83	(*a*)	0·61–0·67	0·64
(7) . .	[0·82–0·83]	[0·82]			
			(*b*)	0·73–0·77	0·75
				[0·70–0·73]	[0·72]
Prothorax (5)				0·48–0·55	
Pterothorax (3)				0·67–0·73	
Abdomen (4) .	1·62–1·74			0·80–0·85	
Total (3) . .	2·92–3·14	3·01			
(6) .	[2·70–2·86]	[2·76]			
Genitalia (1) .	0·60				
Head index .	0·86–0·95	0·90			
	[0·84–0·89]	[0·87]			

Females.

	Length.			Breadth.	
	Range.	Mean.		Range.	Mean.
Head (4) . .	0·93–0·95	0·94	(*a*)	0·75–0·77	0·76
(8) . .	[0·85–0·90]	[0·86]			
			(*b*)	0·85–0·87	0·855
				[0·75–0·78]	[0·77]
Prothorax (5)				0·53–0·57	
Pterothorax (5)				0·77–0·80	
Abdomen (5) .	1·93–2·22			0·98–1·14	
Total (4) . .	3·52–3·60	3·56			
(5) .	[3·20–3·42]	[3·34]			
Head Index .	0·89–0·92	0·90			
	[0·86–0·90]	[0·88]			

Notes.—Length of head taken at midline, breadth *a*, greatest breadth of preantennal region; *b*, greatest breadth of post-antennal region; head index = breadth : length; numbers in round brackets denote numbers of specimens measured; numbers in square brackets are measurements of specimens from *Bucorvus leadbeateri*.

Material examined.—5 males, 5 females from skins and fresh specimens of *Bucorvus abyssinicus* (Boddaert) from Abyssinia and West Nile District, Uganda. In addition, 7 males, 9 females from skins and fresh specimens of *Bucorvus leadbeateri* (Vigors) (formerly *B. cafer* Schlegel) from Tanganyika Territory and the Belgian Congo have been examined. The measurements of these specimens are given in the table of measurements in square brackets under those of specimens from *B. abyssinicus*. In the male it will be seen that there is an overlap in the measurements given, except in those of the total length, where the difference is small and is an unreliable measurement as the length of the abdomen may be dependant on the pressure of the cover glass. There is a small difference in the mean of these measurements. The male also tends to have fewer sternal setae, especially in the genital region, but there are specimens which cannot be distinguished by this character from true *docophorus*. A comparison of the shapes of the heads in both sexes by the projection method (*see* Clay and Hopkins, 1954 : 230) shows that there is no constant difference in this character. In the female there is no overlap in the measurements under consideration, except in the head index, but the differences are small. A single female from *B. abyssinicus* from Uganda (not included in the measurements given) is smaller, except in the measurements of the abdomen, and otherwise falls within the range of specimens from *B. leadbeateri*. It also has fewer lateral setae each side of the genital region. It may be teneral.

It would be expected from Harrison's rule (see Clay 1951) that specimens from *B. leadbeateri*, the smaller host, would be smaller than those from *B. abyssinicus*, which is distinctly larger. In some cases (see Timmermann, 1954) related hosts are parasitised by the same species of Mallophaga, the populations of which on the different hosts differ only in size and not in proportion to the size of their hosts. It is possible, therefore, to find two populations, not necessarily the most nearly related, appearing as identical, whereas two populations which are perhaps more nearly related, may differ in size because of differences in size of the hosts. In such species the populations containing the largest specimens may be quite distinct with no overlap, from those with the smallest, but each may overlap with the intermediate populations. Thus, there is a " host cline " in measurements analogous to the geographical cline of free-living populations, and the decision as to which populations should be named is difficult, as is the case with all species showing clines. When the full distribution of the species is known it may be useful to name the two ends of the cline, the other populations being referred to by the name of the nearest subspecies together with its host distribution as suggested by Timmermann, 1954 : 44. It is considered that names should be given only to those populations the individuals of which are recognisable, not those separable on statistical grounds only, although such facts are of interest and should be discussed in studies of the species. In the case under discussion, therefore, it is proposed to include in *Bucorvellus docophorus* the population from *B. leadbeateri*, although the individuals show a tendency towards smaller size.

As the type material of *Lipeurus docophorus* was destroyed with the bulk of the Halle Nitzsch and Giebel collection during the 1939–45 war, and in order to prevent a subsequent and different interpretation of the name, application will be made to the International Commission on Zoological Nomenclature for the recognition of a neotype of *Lipeurus docophorus* Giebel, 1874, as follows :

Male, as described and figured above, in the British Museum (Natural History), slide no. 620, from *Bucorvus abyssinicus* (Boddaert) from Abyssinia. Neoparatypes: 4♂, 4♀ from the same host species from Abyssinia and West Nile District, Uganda.

ACKNOWLEDGMENTS.

I am indebted to the authorities of the Musée du Congo Belge and of the Institut des Parcs Nationaux du Congo Belge for the specimens from the Belgian Congo and to Mr. G. H. E. Hopkins for the specimens from Uganda.

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PLATE I.

Bucorvellus docophorus (Giebel), specimens from *Bucorvus leadbeateri*.

FIG. 1.—Male. × 30.

FIG. 2.—Female. × 25.

T. Clay *Bucorvellus docophorus* (Giebel)

Adlard & Son, Ltd., Dorking.

TWO NEW PSOCID SPECIES FROM STORED PRODUCTS IN BRITAIN.

By Edward Broadhead, M.A., D.Phil., F.R.E.S.

(*Department of Zoology, Leeds University.*)

The new *Liposcelis* species described here belongs to the family Liposcelidae of the Nanopsocetae. The new *Lepolepis* species is an interesting scaly winged psocid, the second known species of the subfamily Lepolepidinae of the Lepidopsocidae, belonging to the major group Atropetae.

Liposcelis albothoracicus sp. n. (Figs. 1–3.)

Female.—*Colour* (of living specimens): *Upperside:* abdomen dull medium brown, paler than that of *pubescens* and somewhat darker than that of *bostrychophilus*; cranium (with light from behind) and prothorax slightly darker; meso-metathorax and 1st abdominal segment white; antennae and legs as abdomen; clypeus more reddish; eyes black. Dark reddish-brown pigment granules noticeably aggregated on lateral lobes of pronotum and on abdominal terga 2 and 3, being particularly dense at the antero-lateral angles of the abdomen. *Underside:* shiny; meso-metathorax white, rest pale brown; pigment granules scattered on head, thorax and anterior part of abdomen, aggregated on prothorax and on antero-lateral angles of abdomen.

Sculpturing (stained with acid fuchsin and examined at magnification of 700 diameters): cranium dorsally with distinct arched ridges enclosing transverse spindle-shaped areas, these areas smooth or bearing only very indistinct tubercles. Abdominal terga with transverse spindle-shaped areas bearing distinct tubercles, the areas separated by plain narrow tracts bordered by rows of tubercles. Epicranial suture indicated by a break in the sculpturing and by an internal ridge of cuticle.

Head: With long fine hairs uniformly scattered, average length of these hairs on vertex (0·023 mm.) 3–4 times width of adjacent spindle-shaped areas on cuticle, distance between hairs (average 0·014 mm.) about two-thirds their length. Third antennal (i.e. first flagellar) segment with 15–18 annular ridges (12 specimens). Each eye with 7–8 ommatidia—in 53 eyes from 29 individuals, 6 with 7 and 47 with 8 ommatidia.

Thorax: Each lateral lobe of pronotum with 3-5 long strong bristles, truncated apically, forming a transverse row towards its anterior margin, one of these on its lateral tip ("humeral seta", Table I) longer than the others, and with 1–4 small fine hairs more posteriorly near humeral seta (fig. 2, in which the number of hairs and bristles on left and right sides represents extreme observations from 20 specimens). Prothoracic sternum (fig. 1) with 5–8 long bristles on anterior half of sternum—in 50 specimens, 2 per cent. with 5, 32 per cent. with 6, 56 per cent. with 7, 10 per cent. with 8 bristles; no such bristles on posterior half of sternum. Meso-metathoracic sternum (fig. 1) with transverse slightly arched row of 8–11 bristles towards anterior margin—in 50 specimens 4 per cent. with 8, 32 per cent. with 9, 52 per cent. with 10, 12 per cent. with 11 bristles.

Abdomen: With short fine hairs sparsely scattered, average length of these hairs (on terga 3–7) 0·012 mm., distance between hairs 2–4 times their length; with long strong bristles, truncated apically, on 8th, 9th and 10th terga laterally, on epiproct, paraprocts and subgenital plate; five such bristles on each side of almost equal length and longer than remaining bristles on lateral margin of abdomen, one of these on lateral margin of 8th tergum, two on lateral margin of 9th between basal horns of gonopods (the bristle measured, Table I, being the more ventral one) and two on lateral margin of 10th tergum near base of paraprocts. Towards base of epiproct on each side of mid-line a bristle, truncated apically and longer than remaining bristles on epiproct, measurements of this bristle given in Table I. In stained preparations, 1st tergum divided into two transverse sclerites,

a lighter posterior transverse band (intersegmental membrane) on each of terga 5–7 and on 8th tergum laterally, but absent on terga 3 and 4 ; in living specimens the intersegmental membranes are not noticeable ; anterior borders of terga 4–8 each with a very narrow transverse dark brown medial streak. Basal stem of attachment of gonopods to 9th tergum bifurcate.

Body length 1·14–1·27 mm. (10 measurements). Various body measurements are given in Table I.

Male.—*Colour :* as female but slightly paler.

Sculpturing : as female.

Head : with long fine hairs uniformly scattered, average length of these hairs on vertex (0·017 mm.) 3–4 times width of adjacent spindle-shaped areas on cuticle, distance between hairs approximately equal to their length. Third antennal segment with 10–13 annular ridges (12 specimens). Each eye with 5 ommatidia (constant in 40 eyes examined).

Thorax : Each lateral lobe of pronotum with 2, occasionally 3 (in 3 out of 21 individuals and on one side only), long strong bristles, truncated apically, towards anterior margin, one of these on its lateral tip (" humeral seta ", Table I) and 1–2 small fine hairs more posteriorly near humeral seta (fig. 3). Prothoracic sternum with 4–6 long bristles on anterior half of sternum—in 50 specimens, 31 per cent. with 4, 67 per cent. with 5, 2 per cent. with 6 bristles ; no such bristles on posterior half of sternum. Meso-metathoracic sternum with transverse slightly arched row of 6–8 bristles towards anterior margin—in 50 specimens, 11 per cent. with 6, 82 per cent. with 7, 7 per cent. with 8.

Abdomen : with short fine hairs sparsely scattered, average length of these hairs (on terga 3–7) 0·010 mm., distance between hairs about 4 times their length ; with long strong bristles, truncated apically, on 9th and 10th terga laterally, on epiproct, paraprocts and subgenital plate ; 3 such bristles on each side of almost equal length and longer than remaining bristles on lateral margin of abdomen, one of these on lateral margin of 9th tergum (measurements of this bristle in Table I) and two on lateral margin of 10th tergum near base of paraprocts. Towards base of epiproct on each side of mid-line a bristle, truncated apically and longer than remaining bristles on epiproct, measurements of this bristle given in Table I. Terga 1 and 2 each divided into two transverse sclerites.

Body length 0·76–0·82 mm. (10 measurements). Various body measurements are given in Table I.

Table I.—*Linear measurements of* Liposcelis albothoracicus *sp. n.*

Female.

Character.	N.	Mean (mm.)	Standard deviation.	Observed extremes.
Width of head capsule	50	0·277	0·003	0·268 ; 0·284
Antennal length	40	0·899	0·021	0·856 ; 0·937
Length of 4th antennal segment	25	0·077	0·002	0·073 ; 0·082
Greatest width of hind femur	25	0·174	0·004	0·164 ; 0·182
Length of humeral seta	25	0·052	0·002	0·048 ; 0·055
Length of longest apical abdominal bristle	25	0·085	0·002	0·079 ; 0·090
Length of longest bristle on epiproct	15	0·075	0·002	0·071 ; 0·081

Male.

Character.	N.	Mean (mm.)	Standard deviation.	Observed extremes.
Width of head capsule	25	0·190	0·002	0·187 ; 0·194
Antennal length	30	0·750	0·023	0·695 ; 0·795
Length of 4th antennal segment	25	0·058	0·003	0·051 ; 0·064
Greatest width of hind femur	25	0·120	0·003	0·115 ; 0·126
Length of humeral seta	25	0·033	0·002	0·029 ; 0·037
Length of longest apical abdominal bristle	30	0·080	0·003	0·073 ; 0·088
Length of longest bristle on epiproct	15	0·060	0·003	0·056 ; 0·067

ENGLAND: Liverpool, one female in Turkey Millet seed in ship's hold, 28.vii.1953. The millet was loaded at Iskanderum in June, 1953.

The above description is based on a study of individuals from cultures, maintained at 25° C. and 76 per cent R.H. on dried yeast and derived from this wild specimen.

Holotype (♀) and paratypes (♂ and ♀) in the Hope Department of Entomology, Oxford. Other paratypes in the British Museum (Nat. Hist.).

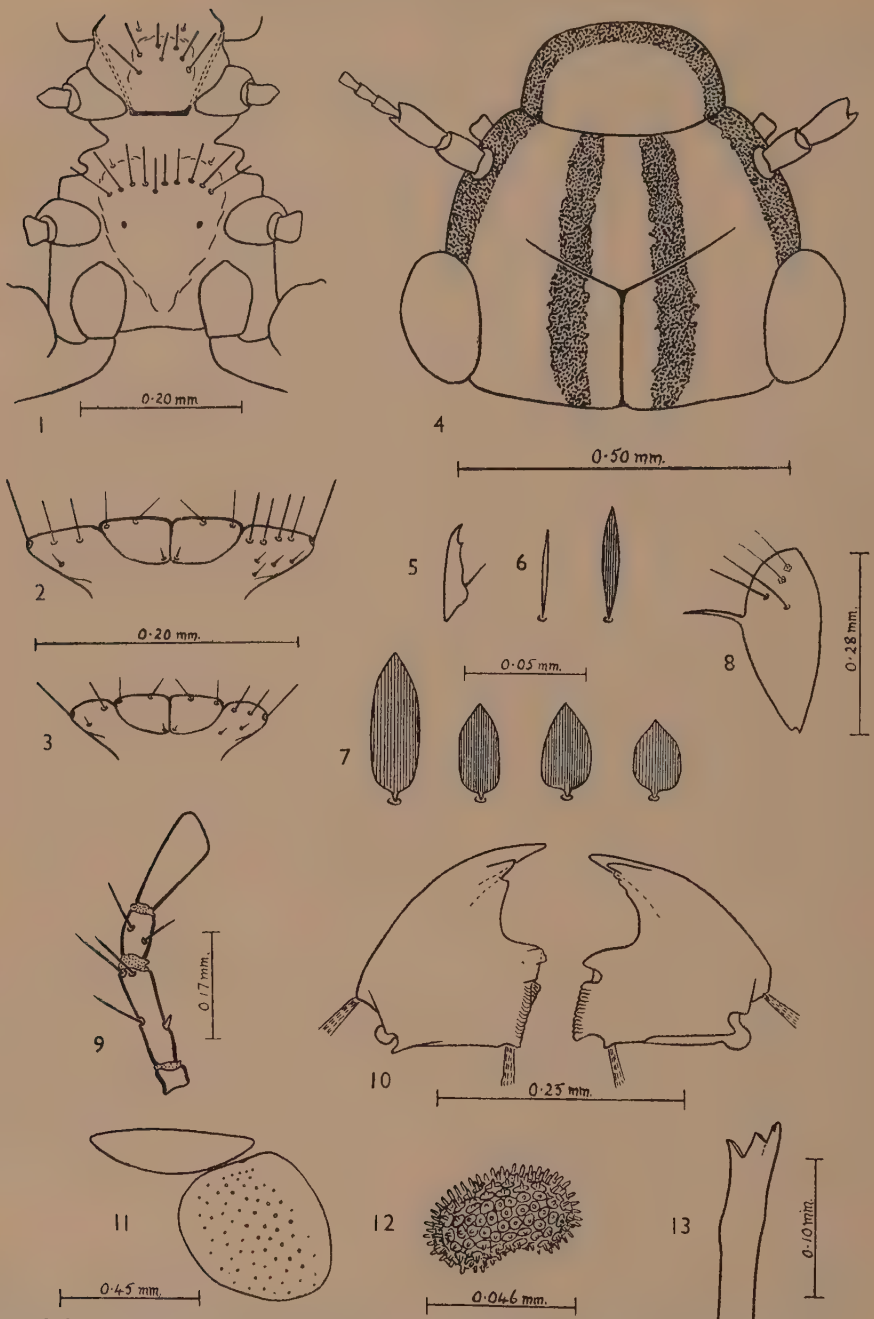
Remarks.—Living specimens of *L. albothoracicus* may readily be distinguished from all other known *Liposcelis* species by their striking colour pattern. This species is very closely related to *entomophilus* (Enderlein) in spite of the great difference in colour between them. Indeed colour is almost the only completely reliable diagnostic character. The colour of *albothoracicus*, brown with a white thorax, contrasts markedly with that of *entomophilus*, which is yellow-ochre with reddish-brown transverse bands on the abdomen. In all the other characters listed here the two species are very similar. They are indistinguishable in head and abdominal sculpturing, in length and density of the hairs on the vertex, in the number of annular ridges on the 3rd antennal segment, in the number of ommatidia and in the absence of intersegmental membranes on abdominal terga 3 and 4. There is only a modal difference in all the remaining characters, whose ranges of variation in the two species overlap, viz., pronotal chaetotaxy and chaetotaxy of the thoracic sterna and all the metric characters listed in Table I, except antennal length for the female and head capsule width for the male. Measurements of these two structures do not overlap in the two species for the sex indicated. Where the colour pattern of the animals is no longer evident, as in cleared mounted specimens, recourse must be had to measurement, although the pronotal chaetotaxy will serve to separate nearly all males of the two species, and the chaetotaxy of the prothoracic sternum will reliably separate a small proportion of the females. The sculpturing of the head and abdominal terga of *L. entomophilus*, which is almost identical to that of *albothoracicus*, is figured by Broadhead (1950).

The following species is the second known species of the genus *Lepolepis*, a member of the Lepidopsocidae, but so unusual in its wing structure that Roesler (1944) has proposed for it a new subfamily, the Lepolepidinae. In the description given here, generic and higher group characters are assessed, as well as specific characters, and Roesler's conclusion that this genus is sufficiently distinct to warrant subfamilial rank is confirmed. The rank accorded to some of the generic and familial characters is tentative, since relevant information from the literature on these features of several Lepidopsocid genera is lacking.

Lepolepis bicolor sp. n. (Figs. 4–13.)

Characters common to other Atropetae:

Median epicranial suture well marked (fig. 4); flagellar segments with no secondary annulations (antennae defective, only five segments remaining); in right mandible the margin between the base of the molar area and the point of insertion of the adductor muscle strongly concave; in left mandible at anterior end of molar area a single large tooth (fig. 10); a single short stout spur on second segment of maxillary palp (fig. 9); terminal segment of maxillary palp dilated distally and truncated, usually, obliquely, at its end; maxillary pick with three tines, one of these arising from the basal half of the longest, which is bifid at its tip (fig. 13); labial palpi two-segmented; prothorax relatively



FIGS. 1–3.—*Liposcelis albothoracicus* sp. n. (1) ♀, thoracic sterna showing chaetotaxy. (2) ♀, pronotal chaetotaxy. (3) ♂, pronotal chaetotaxy.

FIGS. 4–13.—*Lepolepis bicolor* sp. n. ♀. (4) Colour pattern of head dorsally. (5) Claw. (6) Scales from the fore wings. (7) Scales from the abdominal terga. (8) Right paraproct (the small hairs omitted). (9) Maxillary palp showing the sense cone and the strongest bristles only. (10) Mandibles, dorsal view. (11) Mesothorax and right fore wing showing the larger alveoli, which probably bear macrochaetae, the smaller alveoli of the scales omitted. (12) Spermathecal macula. (13) Tip of maxillary pick.

large and not partly hidden by mesothorax ; two short strong spurs at apex of hind tibia ; three tarsal segments ; paraproct produced at its tip into a long strong spur (fig. 8) ; female genitalia fully exposed ventrally and consisting of one pair of gonopods only, the third valvulae, which are elongate and bear many long hairs.

Characters common to other Lepidopsocidae :

Claws with a preapical tooth and with a long setiform process at base (fig. 5) ; eyes pubescent, with very short fine hairs between ommatidia ; scales present on body and on wings ; mid and hind tibiae with very long outstanding setae, of length three times or more the tibial width, as well as much shorter hairs and bristles.

Subfamilial and Generic Characters (i.e. shared with L. ceylonica) :

Flagellar segments 1–3 short, of length only about twice their width (fig. 4) ; the two frontal sutures well marked ; no ocelli ; pronotum rectangular and slightly larger than mesonotum ; fore wings reduced (fig. 11) to small scale-like lobes of length equal to their width and rounded apically, these wings extending backwards only as far as the second or third abdominal segment ; fore wings with no trace of veins ; hind wings absent ; no ctenidia on first hind tarsal segment ; two trichobothria on each paraproct (fig. 8) ; scales as well as hairs present on femora and tibiae, on wings, mesonotum and on abdomen dorsally and ventrally, those on legs and wings long and thin (fig. 6), those on abdomen much broader (fig. 7), all are symmetrical.

Specific Characters.

Female.—*Colour* (in alcohol) : *Upperside :* Clypeus, frons and vertex pale yellow, with two longitudinal blackish-red pigmented bands extending from the epistomal suture to the posterior margin of the head, these bands, one on each side of the mid-line, being separated by a distance equal to the width of each band, and a second blackish-red band on each side on lateral margin of head, extending from anterior margin of eye to anterior part of clypeus (fig. 4) ; labrum dark reddish. Prothorax yellowish, but more sombre (blackish) than the head and with its lateral margin blackish-red. Mesothorax yellowish, but with a blackish-red lateral and posterior margin. Fore wings dull blackish-brown. Abdomen yellow as head but covered with blackish-brown scales ; terminal segment dark blackish-brown. Femora and proximal part of tibiae as wings, tibiae distally lighter and tarsi yellowish. Maxillary palpi and antennae brownish. *Underside :* head and thorax yellow ; coxae as femora ; abdomen yellow but with blackish scales, gonapophyses and terminal segment dark brown.

Other characters.—The following features may not be characteristic of this species, no information being given in Enderlein's description of *L. ceylonica* for comparison. Hairs on head rubbed off, but their alveoli of various sizes and closely set, the distance between them about 2–3 times diameter of the largest alveoli ; the hairs between the ommatidia extending over the greater part of the eye and of length equal to or less than ommatidial diameter ; maxillary palp with a few bristles much stronger than the rest, 2nd segment with one half-way along and two apically and 3rd segment with two such setae (fig. 9) ; abdominal scales sharply constricted at their base (fig. 7) ; in the abdomen a large body, more sclerotised at one end than elsewhere (the spermatheca) and containing an ovoid body with small papillae over almost its entire surface, the spermathecal macula. Its surface structure (fig. 12) is probably characteristic of the species.

Measurements (mm.) : Width of head capsule (including eyes) 0·667 ; interocular distance 0·443 ; lengths of flagellar segments, first 0·046, second 0·032, third 0·038 ; length of maxillary palp segments, second 0·162, third 0·070, fourth 0·154 ; fore wing length 0·458, width 0·447 ; lengths of segments of fore, mid and hind legs respectively : femur 0·475, 0·493, 0·629, tibia 0·498, 0·552, 0·905, 1st tarsal 0·189, 0·235, 0·311, 2nd tarsal 0·067, 0·070, 0·072, 3rd tarsal 0·065, 0·065, 0·068.

Holotype female, from West African ground nuts in an English port, 16.i.1945 (given to me by Dr. L. Finlayson). Holotype in the Hope Department of Entomology, Oxford.

This species is smaller than *Lepolepis ceylonica* Enderlein (1906) and also differs in the colour, particularly of the head capsule, which is uniformly ochraceous-yellow in *ceylonica* and uniformly dark brown in *ceylonica* var. *formosana* Enderlein, 1908.

The fore wings of *Lepolepis* are remarkably similar in shape and in their lack of venation to those of *Lepinotus*, *Trogium* and *Myopsocnema* of the Trogiidae, and no doubt represent an independent, though parallel evolutionary modification, since the more primitive members of both the Lepidopsocidae and the Trogiidae are fully winged with a relatively complete venation. Within both these families reduction of the wings and loss of the capacity for flight is accompanied by loss of the ocelli and reduction of the number of trichobothria on the paraprocts. Thus in the Trogiidae, the macropterous females of *Psoquilla marginepunctata* Hagen have ocelli and four trichobothria on each paraproct, whereas the micropterous females of this species lack ocelli and possess only a single trichobothrium, these sense hairs being absent in the brachypterous *Lepinotus*, *Trogium* and *Myopsocnema* and in the apterous *Cerobasis guestfalicus* Kolbe. In the Lepidopsocidae, fully winged species such as *Soa flaviterminata* Enderlein and *Nepticulomima sakuntala* Enderlein have ocelli and 6–7 trichobothria; the brachypterous *Pteroxanium kelloggi* (Ribaga) possesses only rudimentary ocelli and only two trichobothria. Wing reduction in this latter family appears also to be correlated with loss of hind tarsal combs. Such " ctenidia " are present in the fully winged members of this family, e.g. in *Soa* and *Nepticulomima*, *Lepium*, *Perientomum* and *Echmepteryx*, but are absent in the flightless species, *Pteroxanium kelloggi*, the two *Lepolepis* species, and, according to Enderlein (1903), also in *Echinopsocus erinaceus* Enderlein. These observations suggest that in psocids the ocelli, the trichobothria and the tarsal combs are all concerned either directly or indirectly with flight.

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CLASSIFICATION OF THE ORUSSIDAE, WITH SOME NEW GENERA AND SPECIES (HYMENOPTERA : SYMPHYTA).

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(*British Museum (Natural History), London.*)

1. Introduction.

When Mr. W. L. Brown of Harvard was passing through London on his way to Australia in 1950, I urged him, since he had told me that he was already familiar with Orussidae in the field in North America, specially to look for them in Australia. He told me that they had a characteristic way of running alternately upwards and downwards on standing dead trees in the forest. And then within a few weeks of his arrival in Queensland he sent me a specimen of an interesting new species of *Guiglia* he had seen behaving in the very way he had described to me. Below I have given a new key to *Guiglia* to include this new species and two others discovered since the earlier key (Benson 1938) ; the opportunity is also taken of correcting Maa's (1950) interpretation of *Guiglia sericata* (Mocsáry, 1900) the types of which I have been able to examine through the kindness of Dr. Székessy Vilmos, Director of the Hungarian National Museum, Budapest.

Furthermore, I have before me three Orussidae from Africa representing three new species in two new genera. Two of these specimens belong to the National Museum of Southern Rhodesia and were kindly lent to me by Dr. G. Arnold. One of them is of exceptional interest in showing close affinities with the Australian *Orussobaius*, and the South American *Orussella*, the first biogeographical link in sawflies between South Africa, South America and Australia. And the study of the affinities of these three genera has suggested to me the solution to the subfamily and tribal arrangement of the family. It has also drawn my attention to the fact that, though Africa seems so poor in other sawflies, it is comparatively rich in Orussidae ; already more species (18) in a greater variety of genera have been found in Africa than in any other continent.

I am indebted to Dr. Kruseman, of the Zoologisch Museum, Amsterdam, for lending me the type of *Stiricorsia trifasciata* (Cameron, 1906) and thereby enabling me to identify two specimens, collected in New Guinea by Miss Cheesman, as belonging to this unrecognised species of *Stiricorsia*.

2. Available Material.

Material of this family is very sparse in museum collections. It is to be hoped, therefore, that collectors in warm forests will keep a special look out for them. As parasites of wood boring beetles they should be looked for on dead wood.

In the British Museum (apart from the specimens on loan mentioned above) there are only 75 specimens all told, belonging to 21 species in 11 genera ; whereas in Guiglia's catalogue (1943) 54 species are listed in 11 genera (all of which genera, except *Orussella*, are actually in the collections now before me).

Since this catalogue was written the following additional species have been described :

Orussus dekoormani Maa, 1950. Tonkin.
O. striatus Maa, 1950. Riu Kiu Islands.
Orussobaius normani Rayment, 1951. New South Wales.
Guiglia queenslandensis coronata Rayment, 1951. New South Wales.
Ophrynella rossi Yasumatsu, 1952. New Guinea.

3. The Affinities of the Family Orussidae.

Rohwer (1912) and (1918) dealt in some detail with the general morphology of the family and his conclusion was that the Orussidae should be placed in a separate suborder Idiogastra. Ross (1937), on the other hand, included the Orussidae within his superfamily Siricoidea. This he did largely because the other families of this superfamily, Siricidae, Xiphydriidae and Syntexidae, also live as larvae in wood and share such characters as are often correlated with this habit,—a " closed head " and antennae protected in a groove. He says : " Considering that both the Xiphydriidae and Siricidae have tree-boring larvae there is reason to suppose that an offshoot of their branch might produce a parasite whose host was a wood borer as is the host of *Orussus*. . . . " It might indeed, but this is no evidence that it did so. Rohwer produced a formidable list of major differences between the Orussidae and the rest of the Siricoidea ; these include the entirely different male genitalia and mesonotal sutures, atrophy of the supra tentorial arms, the pupa with its unique external ovipositor reaching forward over the abdomen as far as the front of the head, the petiolate abdomen (narrowed at the apex of the 1st segment as in the Cephoidea), and the survival of vein 2r in the fore wing and the atrophy of 1r.

There is no doubt that Rohwer had the better of the argument, and I propose to treat the Orussidae as belonging to a separate superfamily, the Orussoidea.

4. Hair on the Eyes of Orussidae.

No one seems to have mentioned the hairy eyes of Orussidae. This is a character which is unknown in other sawflies, though common enough in other Hymenoptera, occuring sporadically throughout the Apocrita. In many Orussidae, perhaps in all, the eyes are covered with short setaceous hairs from the cornegenous layer ; but owing to the remarkably thick corneal layer over them in all species except Mocsaryini, the hairs do not project beyond this layer and can only be seen in those individuals in which the corneal layer happens to be transparent.

5. Subfamily and Tribal Groupings.

In 1935 I proposed four subfamilies of the Orussidae (Mocsaryinae, Orussinae, Pedicristinae and Ophrynopinae) based largely on the patterns of the carinae on the face. But by the time I came to revise the classification in 1938 I had realised that, though different patterns of facial carinae were characteristic of different genera and even indicated affinity, the carinae might be lost in individual species or genera, so that the forms in which carinae were absent were not necessarily related. *Ophrynella* Ross, 1937, for example, has no facial carinae, but on all other characters it is obviously related to *Ophry-*

nopus and not *Orussus* ; in fact it is no more than an *Ophrynopus* that has lost these facial carinae. Likewise the new *Orussobaius* from Australia showed no very close affinity with *Orussus*. I therefore deliberately discarded the subfamilies I had formerly proposed until I could discover a sounder basis to demonstrate the affinities. Guiglia, however, in her world catalogue of Orussidae (1943) retained this subfamily grouping and, quite wrongly to my mind, placed *Ophrynella* in the Orussinae.

The scheme I am now proposing differs from the earlier one as used by Guiglia mainly in the association of the Pedicristinae, Mocsaryinae and Orussinae as tribes of a single subfamily, the association of the Australian *Orussobaius*, the Chilean *Orussella* and the new African genus *Leptorussus* in a new tribe Leptorussini of the same subfamily, and the transfer of *Ophrynella* from the Orussinae to the Ophrynopinae, where it is treated as not even generically distinct from *Ophrynopus*. [*Ophrynella* Ross, 1937 = *Ophrynopus* Konow, 1897. **syn. nov.**]

6. Key to Subfamilies and Tribes of Orussidae.

Except for the new genera *Heliorussus* and *Leptorussus* which are described below, the actual genera here can be named by the key in Benson, 1938, and the figures in that paper are not repeated here ; further notes on some of the genera are added below.

1 Fore wing with 2r issuing from near middle of stigma (Benson, 1938, fig. 7). Hypopygium of male simple. Mesoscutellar area parabolic or triangular in shape . . . . . **ORUSSINAE,** 2

– Fore wing with 2r issuing from much nearer apex than base of stigma (Benson, 1938, fig. 6). Hypopygium of male ornamented with 3 tubercles (fig. 15). Mesoscutellar area oblong without clear definition, or parabolic in shape . . . . . **OPHRYNOPINAE,** 5

2 (1) Fore wing with cell 1M much broader at its base than its apex, and either touching Sc + R or closer to it than the length of its own basal side (Benson, 1938, figs. 8 and 9). Hind femur three or more times longer than broad. Antenna of female with third segment equal to 4th + 5th 3

– Fore wing with cell 1M more or less rectangular in form and not closer to Sc + R than the length of its basal side (Benson, 1938, figs. 6 and 7). Hind femur at most about three times as long as broad. Antenna of female with 3rd segment much shorter than 4th + 5th. 4

3 (2) Fore wing with cell 1M touching Sc + R (Benson, 1938, fig. 9). Female (but not male) with carinae on face between eyes (fig. 4 and Benson, 1938, figs. 4 and 5). *Chalinus* Konow (Africa). *Mocsarya* Konow (Mascarene Isles, Syria and Ceylon) . . **Mocsaryini**

– Fore wing with cell 1M not reaching Sc + R (about as far from Sc + R as the length of its own apical side (Benson, 1938, fig. 8)). No carinae on face between eyes in either sex (fig. 1 and Benson, 1938, fig. 2). *Heliorussus* gen. n. (Africa) and *Orussus* Latreille (Holarctic, Africa, and Oriental to New Guinea) . . . . **Orussini**

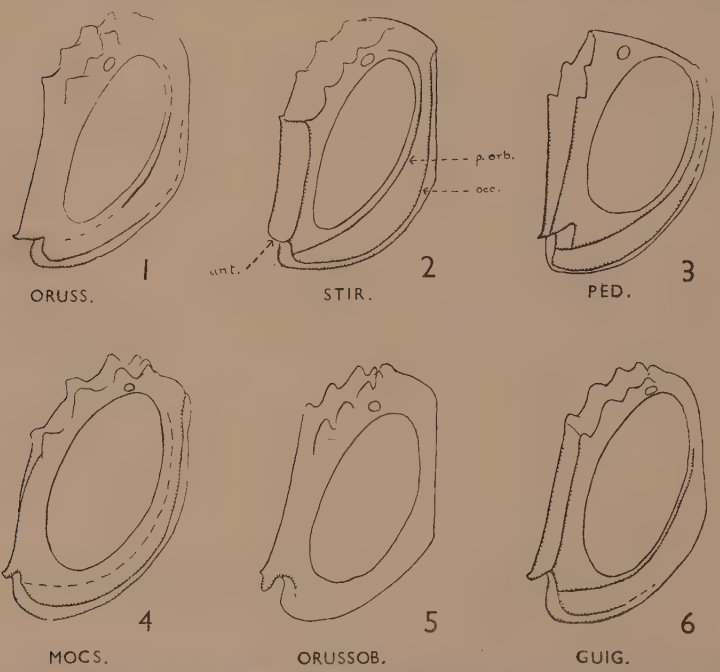
4 (2) Carinae on face converging towards the front (Benson, 1938, fig. 1), and head behind the eyes with post-orbital and occipital carinae developed (fig. 3). Whole insect covered with long outstanding setae, much longer than the diameter of the front ocellus, and on head and thorax these are ligulate. *Pedicrista*

Benson (Africa) . . . . . **Pedicristini**

– Face without carinae between eyes, and behind eyes both post-orbital and occipital carinae are absent (fig. 5). Pubescence short. *Leptorussus* gen. n. (Africa), *Orussella* Benson (Chile), and *Orussobaius* Benson (Australia) . . . . **Leptorussini** trib. n.

5 (1) Scutellar area oblong and ill-defined (Benson, 1938, fig. 11). Head with both post-orbital and occipital carinae complete behind the eyes and joining antennal carinae in front (fig. 2). *Ophrynopus* Konow (= *Ophrynella* Ross) (C. & S. America) and *Stiricorsia* Konow (Austro-oriental) . . . . . **Ophrynopini**

– Scutellar area parabolic in shape and raised with carinate lateral and hind margin (Benson, 1938, fig. 10). Head with either the occipital carina (*Guiglia*) (fig. 6) or the postorbital (*Kulcania*) (cf. fig. 4) obsolescent. *Guiglia* Benson (Australia and New Zealand) and *Kulcania* Benson (Costa Rica) . . . . . **Guigliini** trib. n.



FIGS. 1–6.—Head from the left side to show (diagrammatically) the carinae behind the eyes in: (1) *Orussus*; (2) *Stiricorsia*; (3) *Pedicrista*; (4) *Mocsarya*; (5) *Orussobaius*; and (6) *Guiglia*. *ant.* = antennal carina; *p.orb.* = post-orbital carina; occ. = occipital carina.

7. Some Genera and Species.

Orussinae

Orussini

Heliorussus gen. n.

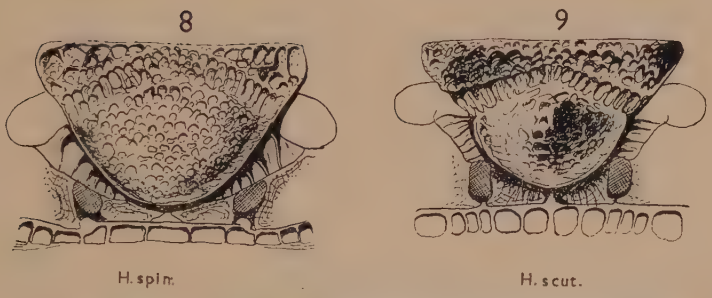
Head without carinae between the eyes; the antennal carina (forming the front margin of the face) continues laterally above the antennal groove and then dorsally to form the

occipital carina behind the vertex ; post-orbital carina more or less developed along the length of the outer orbit, but not joining the antennal carina across the gena (cf. fig. 1). Upper head with more or less five tubercles forming a circle, open in front, round the front ocellus. Mouthparts as in *Orussus*. Antenna as in *Orussus* with third segment longer than fourth and fifth in female.

Thorax with parapsidal furrows in mesonotum present, and the notaulices and median furrow present in front but becoming obsolete behind. Scutellar area parabolic in shape, rounded behind with a carinate margin, raised with declivous sides, and produced behind so that a straight line joining the front of the cenchri would cut through the rounded hind margin of the area (fig. 8–9). *Legs* with femora slim ; hind femur about three times as long as its medial width. Apices of tibiae obliquely truncate (fig. 11) so that they are strongly produced above (the length of the apical margin is almost twice the width of the tibia taken at this distance from the apex), and twice the length of the second tarsal segment ; and with inner apical spur several times shorter than outer spur. *Wings* as in *Orussus* but that cell 1M is very little broader at base than apex and is as far or further from Sc + R than the length of its own apical side.

Abdomen as in *Orussus*, but more strongly contracted at apex of first segment and more strongly expanded towards apex ; second segment equals third plus fourth. Africa.

Type species : Heliorussus scutator sp. n. (Sierra Leone).



Figs. 7–9.—Scutellar area with tegulae (cross-hatched) and neighbouring parts of thorax in : (7) *Orussus thoracicus ;* (8) *Heliorussus spinifer ;* and (9) *H. scutator*.

This genus is close to *Orussus*, but is distinguished as follows : the form of the scutellar area is different, rounded behind (instead of triangular) with a carinate margin and declivous sides and an apex that is produced further back (so that if a line should be drawn through the front of the cenchri it would cut through the scutellar area (figs. 8–9) : in *Orussus* such a line would be behind the but slightly raised scutellar area (fig. 7)) ; the apices of the hind tibiae are more strongly produced. (The apical margin is almost twice as

long as the second tarsal segment (fig. 11); in *Orussus* these two measurements are approximately the same (fig. 10)); cell 1M in the forewing is further away from Sc + R. (It is at least as far away as the length of its basal side, but less than this in *Orussus*.)

Heliorussus scutator sp. n.

Black to piceous with the following parts slightly paler: front margin of frons, margins of tergites, third to sixth sternites and apical margins of others, front femur and undersides of legs generally. On the extreme apex of the middle and hind femora is an opaque white fleck. *Wings* with stigma, C, Sc + R, and those parts of other veins crossing infuscated patches piceous; rest of venation colourless; wing membrane hyaline at extreme apex of fore wing, in a band across the fore wing stretching from the apex and apical half of the stigma, and in most of the anal region of the fore wing as well as in the whole of the hind wing; between the hyaline apex of the fore wing and the hyaline stigmatal band there is a slightly smoky band with the pubescence longer and darker; from the basal part of the stigma to the marginal incision of the vannal fold is a dark, heavily infuscated band with strong black pubescence, and the band reaches along the costal area and joins a large black patch centred on the vein M + Cu1 and reaching from R to A1.

Head coarsely and irregularly punctured with rough surface sculpture on the walls of the punctures, and fine pale pubescence hiding the sheen. Whole *thorax* very coarsely punctured; mesonotum dull and rugged in appearance with jagged projections between the punctures and without a median carina, though in the middle there is a raised tubercle; immediately in front of the scutellum and behind this tubercle is a patch of adpressed silvery pubescence; scutellar area raised in front and strongly convex, while its hind and lateral margin is inflexed (fig. 9); pronotum and mesepisternum are coarsely reticulate with fine surface sculpture as well.

Abdomen with fine squamose coriaceous sculpture and on the first tergite and the bases of the second and third there are dense coarse punctures. Length 5 mm.

Holotype male, Sierra Leone: Movahba, 16.ii.1925 (*E. Hargreaves*) (British Museum (Nat. Hist.)).

This new species is distinguished from *H. schoutedeni* (Guiglia) by the dull very rough surface sculpture of its mesonotum with its central tubercle (*H. schoutedeni* has instead a median longitudinal carina to the mesonotum) and by the strongly convex scutellar area with inflexed margins, and also by the finer surface sculpture of the abdomen without definite punctures beyond the third tergite.

Heliorussus spinifer sp. n.

Female.—Like *H. scutator* except for the following colour differences: the white on the legs is more extensive, spreading to the bases of the tibiae of all the legs; the rest of the integument is more uniformly black, there being no paler piceous parts on the underside of the abdomen or on the hind femora.

There are also the following differences in structure: the mesonotum is more finely though very densely punctured all over; there is no tubercle in the middle of the mesonotum, nor silvery depressed pubescence; the scutellar area is itself almost flat, though the carinate lateral margin is a little inflexed (fig. 8); and on the abdomen, in addition to the punctures on the first tergite and the bases of the second and third tergites, there are also punctures on the bases of the succeeding tergites, though these are shallow and are obscured by the coriaceous surface sculpture and likewise they cover the whole of the underside. Length 7 mm.

Holotype female, Southern Rhodesia : Melsetter, 18.x.1950 (*Dr. G. Arnold*) (National Museum of Southern Rhodesia).

Leptorussini trib. n.

Leptorussus gen. n.

Head without carinae between the eyes (cf. fig. 5) ; antennal carina (forming front margin of face) forms upper margin of antennal groove across gena and then fades out laterally so that the occipital carina is not apparent ; post-orbital carina also obsolete. Upper head with three tubercles each side of front ocellus arranged in an oval, and behind this are three or four transverse ridges made up of fused tubercle pairs. Mouthparts as in *Orussus* ; antenna (female) with no basal segments elongate, and fourth scarcely longer than fifth.

Thorax with parapsidal furrows present on sides of mesonotum but without notaulices or median furrow apparent ; scutellar area parabolic in shape, rounded behind, raised above the lateral parts of the scutellum by declivous sides. *Wings* with 2r of fore wing issuing from near middle of stigma ; cell 1M with apical side longer than basal and the cell distant from Sc + R by much more than its own basal side ; Sc + R is subparallel with C throughout, not diverging from it apically (in Ophrynopinae, Orussini and *Orussobaius* of Leptorussini it diverges apically). Legs with hind femur sub-discoidal in shape, less than twice as long as broad ; hind tibia transversely truncate at apex without upper projection and with very short spurs of which the inner one is only about half as long as the outer.

Abdomen subparallel-sided ; second segment about as long as third and fourth together ; each tergite from third to seventh with a shining sparsely punctate basal portion strongly contrasted with the rest of the dorsum, which is dull and densely punctate.

Type species : *Leptorussus africanus* sp. n.

This genus is extremely close to the Australian *Orussobaius* Benson, which differs from *Leptorussus* in the following ways : on the head there are only two pairs of tubercles each side of the front ocellus apart from the ridges behind the ocellus (which represent three pairs of fused tubercles), and the antennal carina is more or less obsolete medially, though the pattern of carinae on the sides of the head are the same ; vein Sc + R in fore wing diverges from C towards the apex (as in *Orussus* and all other *Orussidae* except *Leptorussus*) ; the tibial spurs on the hind legs are equal in length (in *Leptorussus* and all other Orussidae the inner spur is only about half as long as the outer one) ; and the middle tergites of the abdomen are not divided into clearly defined shining basal and dull apical portions.

Leptorussus africanus sp. n.

Female.—Black or piceous with the antenna and legs, except coxae and hind femur, more or less brown. *Wings* hyaline with three faintly smoky transverse bands in the fore wing as follows : apical band covering the apex of the wing to include about the apical two-thirds of cell 3R.1 ; medial band to include about the stigma and about the apical third of Sc + R ; and the basal band to cover about the basal third of Sc + R. Stigma and veins in the smoky patches brown ; rest of venation colourless.

Head and *thorax* with dense and coarse punctures, becoming so dense as to become reticulate on the vertex, behind the eyes and on the mesonotum, scutellum and pleura ; within the punctures the surface is finely and evenly coriaceous, almost squamose.

Abdomen above with large coarse reticulate punctures, though on each of the middle tergites 3–7 there is a medial basal portion (one-quarter of the third tergite to one-sixth

of the seventh) which is shining and scarcely punctate at all; laterally and below, the abdomen is covered all over with a dense fine regular coriaceous sculpture almost squamose. Length 5 mm.

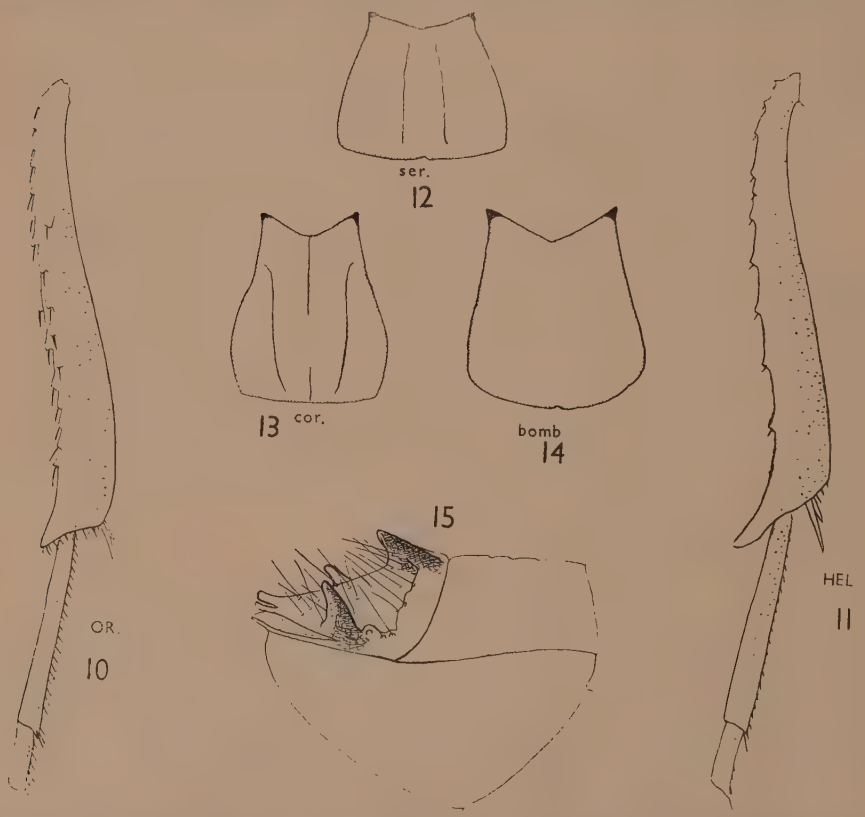
Holotype female, Southern Rhodesia: Bulawayo, 29.iv.1927 (*R. H. R. Stevenson*) (National Museum of Southern Rhodesia).

Ophrynopinae

Guigliini trib. n.

Guiglia Benson, 1938

In 1938 I omitted *G. sericata* (Mocsáry, 1900) (New South Wales) from my key to this genus as I found it quite impossible to decide, on the basis of the original description alone, which (if any) of the two species of the genus represented in the British Museum from Queensland could be identified with it. Maa (1950), finding representatives of still another species of *Guiglia* (from New South Wales) in the Taiwan Agricultural Research Institute, identified them as *G. sericata*, presumably on the basis of the country of origin.



Figs. 10–15.—Hind tibia and basal tarsal segments in: (10) *Orussus:* (11) *Heliorussus.* Facial area in *Guiglia* spp.; (12) *sericata;* (13) *coracina;* and (14) *bombycinis:* (15) Apex of abdomen of *Kulcania* ♂ reversed to show tubercles on hypopygium.

An examination of the types of *G. sericata*, however, shows that they belong to the same species as *G. queenslandensis* (G. Turner). The type series is in excellent condition and consists of four females and two males. The species described by Maa, and called by him *G. sericata*, is apparently very much closer to *G. bombycinis* Benson than to that species and is given a new name below.

Key to species of Guiglia.

1. Transverse carina present joining the front ocellar tubercles between the eyes. Eyes closer together behind than the distance between hind ocelli. Fore wing with extreme apex hyaline and with two transverse smoky bands more or less developed 2

. No transverse carina joining the front ocellar tubercles (Benson 1938, fig. 27). Eyes behind about as far or further apart than the distance between the hind ocelli. Fore wings with apex beyond vein 2r more or less smoky and base subhyaline. (Legs, stigma, C and Sc + R in fore wing black. Lateral ocellus between fourth and fifth tubercle and distant from orbital margin by about one half its own diameter. Abdomen without definite lateral patches of silky adpressed pile. New Zealand and Chatham Islands.) **schauinslandi** (Ashmead)

2 (1) Legs, stigma, veins C and Sc + R of fore wing all black. Antenna with fifth segment equal to third plus fourth ; frontal carinate area further more or less divided longitudinally by a medial and two subsidiary lateral carinae (fig. 13). Fore wing of female with sub-basal fuscous band fading out before reaching vein A1. Lateral ocellus touches eye margin beside fourth tubercle. N. Queensland . . . . . **coracina** sp. n.

. Legs usually mainly red with white on bases of tibiae ; stigma of fore wing mainly yellow and white ; veins C and Sc + R yellow in pale parts and brown in fuscous bands ; antenna with fourth segment little shorter than fifth ; frontal carinate area without a medial longitudinal carina, though it may have two subsidiary lateral carinae more or less developed. Fore wing of female with sub-basal fuscous band reaching almost to anal margin. Lateral ocellus not or scarcely touching eye margin 3

3 (2) Frontal carinate area of head with its greatest length longer than its greatest breadth (fig. 14) ; the upper transverse carina is at or above the level of the middle of the eye, but the area is not further divided by any definite subsidiary carinae. Fore wing in female with basal hyaline band as broad as sub-basal infuscate band . 4

–. Frontal carinate area on head not longer than broad (fig. 12) ; the upper transverse carina is below the level of the middle of the eye ; and the area is also partly further divided longitudinally by two subsidiary carinae more or less developed from above. Fore wings in female infuscate at base 5

4 (3) Lateral ocellus about one-quarter its diameter distant from eye margin, beside the fourth tubercle. New South Wales. (= *sericata* (Mocsáry) Maa, 1950 nec Mocsáry, 1900) . . . **aureola** sp. n.

–. Lateral ocellus but a hair's breadth from the eye margin ; and situated between third and fourth tubercles, N. Queensland **bombycinis** Benson

5 (3) Seventh and eighth tergites of female not covered all over with silky golden pile, but there is a fleck of such pile each side of the

tergites from the second. Facial carinated area only partly subdivided by two subsidiary carinae which reach about half way down from the top. New South Wales. (= *Guiglia queenslandensis coronata* Rayment) . . . . **coronata** Rayment **stat. n.**

–. Second to sixth tergites of female each with a lateral spot of silky golden adpressed pile, becoming progressively larger behind; on the sixth, seventh and eighth tergites the spots are fused medially. Facial carinated area subdivided by two subsidiary longitudinal carinae reaching from the top to the bottom (fig. 12). Queensland and New South Wales. (= *queenslandensis* G. Turner **syn. nov.**) **sericata** (Mocsáry)

Guiglia coracina sp. n.

Female.—Black; with silky adpressed pubescence covering head (golden on face, silvery behind eyes), pronotum and mesopleura (silvery); a lateral fleck each side of the first to sixth tergites, very small and silvery on the front tergites, and on the seventh and eighth tergites golden and covering almost the whole tergite.

Wings subhyaline with a subapical fuscous transverse band covering basal half of cell 3R1 and basal half of stigma, a fuscous smudge occupying the apical third of the basal cell R, and another occupying the basal third of the anal cell; stigma and veins where crossing fuscous patches black or piceous, but elsewhere pale brown.

Head with the facial area between the eyes surrounded by a carina and longer than broad (fig. 13); the transverse carina between the ocellar tubercles is above the middle of the eyes; the area is also partially further divided longitudinally by the development to a variable extent of a median carina, and each side of this by a carina starting from below but fading out before reaching the top. There are about four pairs of separate ocellar tubercles, and behind these a confused conglomerate of coarse punctures; the lateral ocelli actually touch the eye margin; eyes strongly converge towards the vertex where they are about one-third closer than the distance between the posterior ocelli (1·0 : 1·3). Punctation coarse and dense, but mostly obscured by the silky pile. Mouthparts normal. Antenna with third and fourth segments short so that together they are about as long as the fifth.

Thorax dull and rough, with fine irregular and mostly dense punctures; on pronotum and mesopleura the punctation is obscured by silky pile; front of mesonotum, including the medial keel, with shining interspaces between the punctures. Hind tibia with a single row of about 20 tubercles behind.

Abdomen with punctation above much as on front lobes of mesonotum; punctures irregular with scattered shining interspaces about as large as punctures; hind margin of first tergite impunctate; basal margins of fifth to eighth tergites with coriaceous surface sculpture free from definite punctures; on each side of the first to sixth tergites there is a small patch of silky adpressed pile covering almost the whole tergite. Length 8·5 mm.

Holotype female, NORTH QUEENSLAND: Melanda, 5.xi.1950 (*W. L. Brown*) (Museum of Comparative Zoology, Harvard).

Guiglia aureola sp. n.

For a description of this species see Maa, 1950 : 33–4 with figs. 4–7, as *Guiglia sericata* Mocsáry.

Ophrynopini.

Stiricorsia trifasciata (Cameron, 1906) **sp. revocata.**

Miss L. E. Cheesman collected, in February, 1936, at Njau-Limon, south of Mount Bougainville at 300 ft. in west New Guinea, 1 male and 1 female of a species which agrees with Cameron's description and type of *Oryssus trifasciata*. There is also a female of this species in the British Museum from Aru and named "*Oryssus maculipennis*" by Smith.

This species has been treated by Forsius (1926) as a synonym of *Stiricorsia maculipennis* (Smith) as both are found in New Guinea and Aru ; but the two can be distinguished, as follows, and are evidently distinct species :

S. trifasciata.—Facial area not demarcated laterally with a carina on the inner orbits. Middle tergites (third and fourth) of abdomen with coarse and irregular punctures often fusing together, and in the middle with interspaces often smaller than the punctures ; only about the basal one-quarter with fine scattered punctures and coriaceous interspaces. (? syn. *Ophrynella rossi* Yasumatsu). Aru and New Guinea.

S. maculipennis.—Facial area with a surrounding carina. Middle tergites (third and fourth) of abdomen finely and more regularly punctured, on the middle third, with the punctures separated by interspaces as large as the punctures, and the basal third with very fine scattered punctures and coriaceous interspaces. Aru and New Guinea.

Stiricorsia rossi (Yasumutsu, 1952) **comb. nov.**

Ophrynella rossi Yasumutsu (from New Guinea), as shown by the dimensions of the hind femur and the form of the mesonotum, belongs to *Stiricorsia* rather than to *Ophrynopus* and represents a parallel development in *Stiricorsia* to that of "*Ophrynella*" from *Ophrynopus*. From the original description it appears that this species only differs from *S. trifasciata* (Cameron) in that the transverse facial carina is slightly more broken down medially ; it may well therefore prove to be a synonym of *S. trifasciata* (see above).

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TWO NEW COLLEMBOLA ARTHROPLEONA FROM BRITAIN.

By J. T. Salmon, D.Sc., F.R.S.N.Z., F.R.E.S.

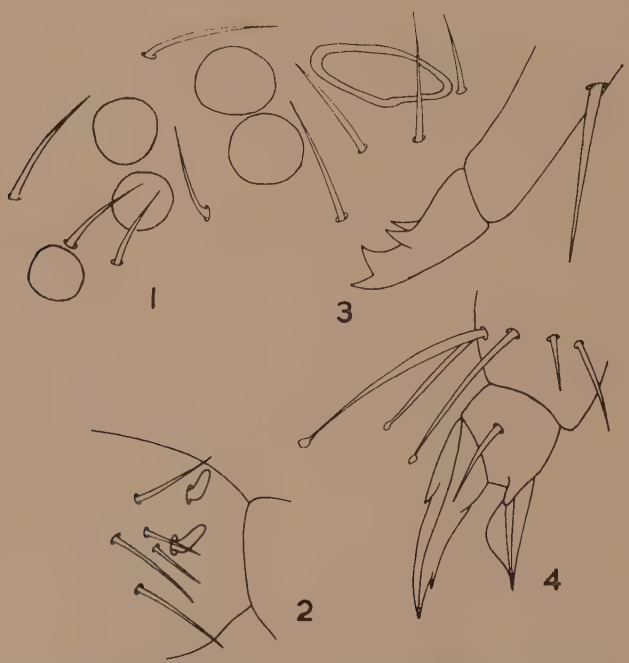
(*Victoria University College, Wellington, New Zealand*)

Parafolsomia ianthina sp. n. (Figs. 1–4.)

Colour.—Body brilliant violet all over, legs and furcula paler or tending to white, antennae pale violet, ocellar fields very deep violet or black.

Clothing.—Moderate, of short simple setae; some longer ones posteriorly and with typical transverse bands of setae around the posterior segmental margins.

Body.—Length up to 1·3 mm. Antennae slightly longer than head, the four segments related as 25 : 38 : 40 : 66; Ant. IV with apical sensory dome, numerous long, straight, blunt sense rods around apex and many long setae; Ant. III with two subapical short, stout, bent, fully exposed sense rods. Ocelli five to each side, subequal except for the posterior one, which is a little smaller. Post-antennal organ elliptical, double outlined, and about one and a half times as long as an ocellus. Rami of tenaculum each with four barbs and the corpus with four simple setae.



Figs. 1–4.—*Parafolsomia ianthina* sp. n. (1) Ocelli and postantennal organ, × 240. (2) Sense organ Ant. III, × 720. (3) Apex of dens and mucro, × 720. (4) Hind foot, × 720.

(The magnifications given are the magnification at the microscope exit pupil in each case.)

PROC. R. ENT. SOC. LOND.(B) 24. PTS. 1–2. (FEBRUARY 1955).

Legs.—Claw with a pair of large outer teeth just above half-way down, a single inner tooth at two-thirds down and a basal inner ridge extending about one-fifth down; a long basal seta to each side of claw. Unguiculus lanceolate with broad inner curved lamella and broad straight outer lamella, the whole reaching to about the level of the distal tooth of claw. Three strongly clavate tenent hairs to each foot, placed in line across the tibiotarsus, the central hair the longest and approximately equal to the claw in length, the others shorter.

Furcula.—Short, reaching only to the posterior border of Abd. II. Manubrium to dens to mucro as 70 : 95 : 7. Manubrium with about 20–24 short setae. Dens crenulate along central and apical portions only and with two rows of about twelve setae each along the anterior face. Mucro very small with four teeth, which are—a small apical, a larger erect pre-apical and two lateral teeth, one to each side, at about centre.

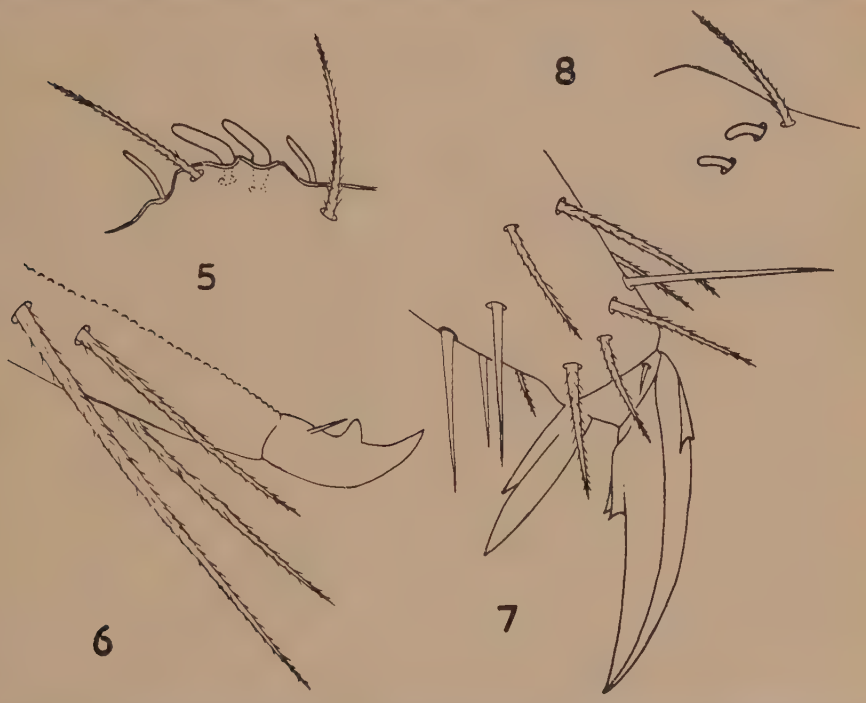
Middx.: Ruislip, Copse wood, from a ditch, in very damp leafmould which was collected by Mr. M. E. Bacchus and from which the Collembola were obtained by using my extraction apparatus.

Type.—Holotype in British Museum (Natural History); paratype in Author's collection.

Troglosinella clayæ sp. n. (Figs. 5–8.)

Colour.—Entirely white.

Clothing.—Heavily clothed with almost hyaline, rounded or oval shaped scales that are clothed with longitudinal bands of very coarse cilia; numerous short ciliated setae inter-



Figs. 5–8.—*Troglosinella clayæ* sp. n. (5) Sense organ Ant. III, × 720. (6) Apex of dens and mucro, × 500. (7) Hind foot, × 500. (8) Sense organ Ant. II, × 720.

(The magnifications given are the magnification at the microscope exit pupil in each case.

spersed with occasional longer ones and a few moderately long plain setae ; flexed ciliated setae at apex of mesotergum ; a pair of lasiotrichia on each side of Abd. II. Legs and furcula scaled ; Ant. I and base of Ant. II only with scales.

Body.—Length up to 1·8 mm. Antennae slightly more than twice length of head, the four segments related as 8 : 18 : 21 : 32. Ant. IV annulated and clothed with short ciliated and short plain setae, no apical sense organ ; sense organ of Ant. III consisting of two stout, bent, sense rods behind an integumentary fold with a single, more slender, bent sense rod removed and below, on each side ; Ant. II subapically with a pair of short, slender, strongly bent, exposed sense rods ; at base of Ant. I a group of short, spine-like ciliated setae. Rami of tenaculum each with four barbs.

Legs.—Claw and unguiculus finely granulate. Claw with a pair of outer teeth at about one-fifth down and a pair of narrow wing-like inner teeth reaching from base to about one-third down. Unguiculus about half as long as claw, lanceolate, with a wing-like tooth on outer edge at about two-thirds down. A very short basal seta to each side of claw. A single non-clavate tenent hair, shorter than claw, to each foot and seven long stiff plain setae down each tibiotarsus, on the face opposite to the tenent hair.

Furcula.—Long, reaching to ventral tube. Dens longer than manubrium as 56 : 40, annulated and corrugated, densely clothed with scales basally but with ciliated setae distally ; no spines occur on the posterior face, but there are many coarsely ciliated setae, some of which are short and straight while others are long and curved. Mucro elongated, narrow, bidentate with basal spine, the apical tooth taller than the pre-apical, which is short and broad ; mucro surrounded and slightly over-reached by long ciliated setae ; uncorrugated portion of dens six times length of mucro.

Surrey : Lightwater, under stones (*Miss T. Clay*). I have very much pleasure in naming this species after Miss Clay.

Type.—Holotype in British Museum (Natural History) ; paratype in Author's collection.

Remarks.—In each case this is the first record from Britain of species belonging to the genera *Parafolsomia* and *Troglosinella*. The genus *Parafolsomia* was erected by myself in 1949 for some New Zealand and Antarctic species, while the genus *Troglosinella* was erected in 1949 by Delamare-Deboutteville for some species from caves in Tennessee and Alabama, U.S.A. The present species, *Troglosinella clayæ*, is not a cave-dwelling species, but comes from under stones in the open. It agrees perfectly, however, with the characters of the type species for the genus *T. hirsuta* Del.-Deb., 1949.

MOSQUITOES (DIPTERA: CULICIDAE) FROM THE TROPICAL INSTITUTE AT HAMBURG.

By P. F. Mattingly, F.R.E.S.

(*British Museum (Natural History)*).

During a recent visit to the Tropical Institute at Hamburg I was enabled, through the kindness of the Director, Professor Nauch, and of the Professor of Medical Entomology, Professor Weyer, to abstract some of the more valuable specimens from the collection of mosquitoes assembled there by Professor Martini and to bring them back as a gift to the British Museum (Natural History). The material in question contains specimens from the type series of many of the species described by Martini who had not, except in one or two cases, marked types. Where the actual type specimen appears to be identifiable with certainty, as in the case of species described from a single specimen, I have marked it as such. In other cases, where the whole or a part of the original type series is still available, I have marked lectotypes. It must, unfortunately, be presumed that types and type series which can no longer be traced were destroyed during the war, when a part of the Institute, including Martini's study, was damaged by bombing. Some notes on the collection follow.

Chagasia fajardoi var. *stigmopteryx* Martini (1932*a*). Described from a specimen in the Deutsches Entomologisches Institut in Berlin. I was unable to find any specimens in Hamburg.

Anopheles amaurus Martini (1929). This species was described from a small number of specimens from Turkestan collected by Chodukin. It would seem that the only specimens remaining from this series are two mounts of male terminalia, now in the British Museum (Natural History). I have marked one of these as hololectotype and the other as a paratype. The holotype is labelled as from Beu Anen, Taschkent, and dated 23.iv.1924. The paratype is also from the Taschkent area and is undated.

Anopheles chodukini Martini (1929). This was described from a unique female adult from Turkestan sent to Martini by Chodukin. I was unable to find the specimen in question. The only specimen which I found under this name was an incomplete female adult from Tiflis, collected in 1930.

Anopheles elutus var. *elutior* Martini (1930), *Anopheles hyrcanus* var. *mahmuti* Martini (1930), *Anopheles cricillium* Martini (1932*b*), *Anopheles parapunctipennis* Martini (1932*b*). I was unable to find any material.

Toxorhynchites hexacis Martini (1931*b*). Described from a unique specimen which was stated by Martini to be in the Museen für Tierkunde und Völkerkunde, Dresden, and may now have been destroyed.

Trichoprosopon espini Martini (1914). The specimen designated by Martini as the type is now in the British Museum. I have marked it as the holotype. The U.S. National Museum, Washington, has two paratypes.

Trichoprosopon hyperleucus Martini (1931*b*). Described from a unique specimen. Lane (1953) places this in the Hamburg Museum, meaning perhaps the Tropical Institute. Martini thinks it went to Dresden in which case it has probably been destroyed.

Trichoprosopon splendens var. *subsplendens* Martini (1931*b*). Described from a unique specimen which I was unable to find.

Wyeomyia monoleuca Martini (1931*c*). Described from a unique specimen stated by Martini to be in the Württembergische Naturalien-Sammlung, Stuttgart.

Wyeomyia schnusei Martini (1931*b*). The type is stated by Lane (1953) to have been in the Hamburg Museum. I was unable to find any specimens in the Tropical Institute. The same remarks apply as in the case of *Trichoprosopon hyperleucus*.

Haemagogus lindneri Martini (1931*c*). Martini stated that the type was in the Stuttgart Museum. I could find no material in Hamburg.

Haemagogus uriartei var. *obscurescens* Martini (1931*b*). Described from specimens from Bolivia and Peru. One female adult from each of these territories is now in the British Museum. I have marked the specimen from Peru as hololectotype and that from Bolivia as a paratype.

Uranotaenia bicolor Martini (1935). Described from a unique female adult now in the British Museum. I have marked this as the holotype.

Theobaldia annulata var. *ferruginata* Martini (1924*a*). Described from a unique female adult which is now in the British Museum. I have marked this as the holotype.

Taeniorhynchus richiardii var. Martini (1930). Since Martini did not name this variety there seems to be no point in marking a type. His description was based on a unique female adult now in the British Museum.

Psorophora leucocnemis Martini (1931*b*). Described from a unique female adult now in the British Museum. I have marked this as the holotype.

Psorophora pruinosa Martini (1935). The male was not described as such and was presumably not taken. The British Museum now has two female adults from the type series. I have marked one of these as the hololectotype and the other as a paratype.

Psorophora simplex Martini (1935). Described from a series of specimens of which three female adults are now in the British Museum. The male was not described as such and was presumably not taken. I have marked one of the females as hololectotype and the others as paratypes.

Aëdes behningi Martini (1926*a*). This species was described twice by Martini (1926*a*, *b*). The description in *Arb. biol. Wolga-Sta.* clearly has priority since the part of this journal in which it is contained was received at the British Museum in June, while the description in *Bull. Acad. Sci. U.R.S.S.* was not published until the following August. The British Museum now has five female adults from the Saratow area, two of which undoubtedly belong to the type series. I have marked one, from Saton, as the hololectotype and another, from Krasny-Kut, as a paratype. A larval skin from the same area also appears to belong to the type series. I have preferred not to mark it as paedotype since it is not associated with any one adult. I have, however, marked it as a paratype.

Aëdes duplex Martini (1926*a*). The same remarks regarding publication apply as in the case of the preceding species. The original description refers to two males collected at Elschanka on 28.v.1925. I could find only one of these, which I have marked as the hololectotype. Placed with this in Martini's collection were a female from the Saratow area and a male, with associated terminalia on a slide, from Samsun in Turkey. These also are now in the British Museum.

I also have a set of male terminalia on a slide agreeing with respect to data with the holotype. I have marked these as part of the hololectotype although it must be admitted as possible that they belong to the second male referred to by Martini since they bear no individual reference number.

Aëdes gallii Martini (1920*a*). The type locality for this species is given by Galli-Valerio and Rochez de Jongh (1907), followed by Martini (1920*a*), as " im kleinen See von Rogneda (2390 m. üb d. M. in Veltlin) . . . ganz umgeben von Geröllhalden". Veltlin is that part of the valley of the Adda now known as Valtellina. I have had difficulty in locating Geröllhalden, but it must be remembered that since the specimens were collected all place names in the area in question have been italianised. I have little hesitation therefore in equating it with Gerola Alta, a locality at the head of the River Gerola, a left bank tributary of the Adda. Both Galli-Valerio and Martini state that the species was taken on 21.vii.1906. The few specimens I was able to find are all labelled either 1901 or vii.1901. I feel sure this represents a *lapsus calami*. The material comprises a unique male adult mounted in balsam, without terminalia, and two whole larvae and a pupa similarly mounted. Subsequent attempts have failed to reveal any further material in Hamburg and I have therefore been reluctantly compelled to mark the incomplete male as hololectotype. The three slides of early stages I have marked as paratypes. Dr. Torres-Canamares and I have compared this material with other specimens from Russia and Germany placed by Martini under *Aëdes pullatus* Coquillett. It has previously been customary to place *Aë. gallii* in the synonymy of *Aë. pullatus*, but as a result of these comparisons we now feel that it is possibly a distinct species. This matter will be discussed at greater length elsewhere. I also brought from Hamburg a female adult, mounted in balsam, and a pupal skin, both collected by Galli-Valerio in the area of the Grubensee in the Swiss canton of Valais. It seems likely that these also are *Aë. gallii* although they are labelled " *pullatus*".

Aëdes nigrocanus Martini (1927). Described from a unique male adult. I was unable to find the terminalia but the rest of the specimen is now in the British Museum. I have marked it as the holotype.

Aëdes oroecetor Martini (1931*b*). Described from nine specimens. Two of these, an adult male with associated terminalia on a slide and an adult female, were presented to the British Museum by the Hamburg Institute in 1950. I have marked these as the hololectotype and allolectotype respectively. All or some of the other specimens probably went to the Dresden Museum and may have been destroyed.

Aëdes pix Martini (1935). Two female adults were sent to the British Museum by the Hamburg Institute in 1950. I marked these as cotypes. One of them is now in the Washington Museum. Other specimens probably went to Dresden and may have been destroyed.

Aëdes quartus Martini (1920*a*). I have specimens from Borsteler Tager, Schnelsen and Wohldorf which were apparently among those recorded in the type description as from " der Nähe von Hamburg". I have marked an undissected male adult from Borsteler Tager as the hololectotype and a female adult from the same locality and with the same date (1914) as the allolectotype. I have marked a female adult from Wohldorf (1910) and another from Schnelsen (1914) as paratypes.

Aëdes rostochiensis Martini (1920*b*). This species was described from the

Schwerin, Warnemunde and Müritz areas in northern Germany. The British Museum now has an adult male which I have marked as hololectotype and three females from which I have marked the allolectotype and two paratypes, all from Müritz. The allolectotype has associated larval and pupal skins, and I have marked it also as the paedotype. One of the paratypes also has associated larval and pupal skins, and the holotype has an associated larval skin. I also brought from Hamburg a larval skin from the Saratow region assigned by Martini to this species and an unassociated larval skin from the type locality.

Aëdes semicantans Martini (1920*b*). Described from a number of specimens from Müritz. The British Museum now has three male and two female adults from the type series. I have marked one of the males as hololectotype and one of the females as allolectotype. The other specimens I have marked as paratypes. The holotype has associated larval and pupal skins, and I have therefore marked it also as the paedotype. The allotype has an associated larval skin. I also brought from Hamburg an associated larval and pupal skin, without associated adult, from the type locality, a female adult from the Schwerin area with associated larval skin, a slide of whole larvae from the type locality and a male from East Prussia, without terminalia, assigned by Martini to this species. The unassociated larvae and skins from Müritz I have marked as paratypes.

Aëdes serus Martini (1920*a*). I have a male adult from Ahrensburg without terminalia and this is the only specimen referable to the type series which I could find. A female adult accompanying it was collected after publication of the type description. I have therefore had no option but to mark the male as hololectotype.

Aëdes subdiversus Martini (1926*a*). The same remarks regarding publication of this species apply as in the case of *Aëdes behningi*. It was described from a unique male adult from the Saratow region. This specimen is now in the British Museum and I have marked it as the holotype. Also placed under this name in the Hamburg collection were a female adult from La Granja, Spain (almost certainly *Aëdes quasirusticus* Torres-Canamares) and a male adult from (?) Wurttemberg. Both are now in the British Museum.

Aëdes subtrichurus Martini (1927). This species was described from specimens from Seldjuk and from the eastern end of the Gulf of Ismid. The British Museum now has two females from the former locality and a male and a female from the latter. I have marked the Ismid male and female as hololectotype and allolectotype respectively and the Seldjuk specimens as paratypes.

Aëdes sylvae Martini (nec Theobald) (1920*a*). The original description appears to have been based on material from widely scattered areas. The British Museum now has a male and a female adult collected in 1919 at Escheburg and Niendorf respectively. Although the name was preoccupied at the time of publication it has seemed best to mark types, and I have accordingly marked the male as hololectotype and the female as allolectotype. Under this name I also found two male adults from Norway and a female from East Prussia, all of later date than the type description. These are now in the British Museum.

Aëdes tarnogradskii Martini (1930). Described from a larva or larvae from the Caucasus. The British Museum now has one of these larvae, from Naltschick, which I have marked as the holotype. I have no evidence that Martini saw any others.

Aëdes terriei Martini (nec Theobald) (1920*a*). The original description was

based on material from various parts of northern Europe. The British Museum has a male and a female adult from Müritz believed to have formed part of this material. I have marked these as hololectotype and allolectotype respectively. I also brought back a whole larva from Ostsee, undated, and two males from the Saratow region, of later date than the original description, placed under this name in Martini's collection.

Aëdes vanemdeni Martini (1931*b*). Described from two specimens from Bolivia. The British Museum now has one of these, from Yungo Coroico, which I have marked as the hololectotype. The other probably went to Dresden and may have been destroyed.

Culex alticola Martini (1931*b*). Described from specimens from Bolivia. The British Museum now has one male and one female adult, which I have marked as the hololectotype and allolectotype respectively.

Culex chalcocorystes Martini (1914). Described from a series of adults and one larva. The British Museum now has one male adult and three females. I have marked the male as hololectotype, one of the females as allolectotype and the other females as paratypes. The Washington Museum also has paratypes.

Culex prasinopleurus Martini (1914). Described from eight male and four female adults. The British Museum now has two adults of each sex from the type series. I have marked one male as hololectotype, one female as allolectotype and the other specimens as paratypes. The Washington Museum also has paratypes.

Culex torrentium Martini (1924*b*). Originally described from Schwarzathal in Thuringia. The British Museum has had two male and two female adults from the type series since 1925. After ascertaining that Martini did not mark any types I have marked one male as the hololectotype, one female as the allolectotype and the other two specimens as paratypes. In 1951 Professor Weyer kindly sent to the Museum three further specimens from Martini's collection from the Saratow region and I brought back from Hamburg a slide of male terminalia from East Prussia (coll. Skwarra) and three slides of terminalia and a larva from Anatolia, labelled "*vagans*", which may be part of the material from Asia Minor referred to by Martini (1931*a*).

In addition to Martini's own species I was able to bring back a very valuable collection of other species not previously represented in the British Museum and of specimens from parts of the world previously poorly represented and, in some cases, relatively inaccessible at the present time, notably the Balkans, Turkey and the U.S.S.R. A short list of this material follows.

Species.	*Provenance.*
Anopheles claviger Meigen.	Italy, Turkey.
hyrcanus Pallas.	Greece, Italy, U.S.S.R.
italicus Raffaele.	Italy (Martini's name).
maculipennis Meigen.	U.S.S.R. (Martini's name).
plumbeus Stephens.	Jugoslavia.
sacharovi Favr.	Greece.
superpictus Grassi.	Jugoslavia, Turkey.
Toxorhynchites bambusicolus Lutz and Neiva.	Peru.
Trichoprosopon digitatum Rondani.	Panama, Peru.
trichopus Dyar.	Panama.

Uranotaenia unguiculata Edwards.	Greece, Italy, Turkey.
Orthopodomyia pulchripalpis Rondani.	Jugoslavia, Turkey.
Theobaldia alaskaensis Ludlow.	Germany.
annulata Schrank.	Jugoslavia.
borealis Shingarew.	U.S.S.R. (Martini's name).
fumipennis Stephens.	Germany.
glaphyroptera Schiner.	Germany, Jugoslavia. (Martini's name.)
longiareolata Macquart.	Greece, Jugoslavia, Turkey, U.S.S.R.
subochrea Edwards.	U.S.S.R. (Golodnaya Steppe, Turkestan, *see* Martini 1930).
Taeniorhynchus araozi Shannon and Del Ponte.	Peru.
richiardii Ficalbi.	Hungary.
Psorophora holmbergi Lynch Arribalzaga.	Paraguay, Uruguay.
Aëdes albifasciatus Macquart.	Chile.
annulipes Meigen	U.S.S.R.
cantans Meigen.	U.S.S.R.
caspius Pallas.	U.S.S.R.
colonarius Dyar.	Chile.
communis Degeer.	U.S.S.R.
condolescens Dyar and Knab.	Cuba.
cretinus Edwards.	U.S.S.R. (Georgia. Described in detail elsewhere (Mattingly, 1954*b*.))
cyprius Ludlow.	Manchuria, U.S.S.R.
detritus Haliday.	Greece, Turkey.
diantaeus Howard, Dyar and Knab.	Germany.
dorsalis Meigen.	Jugoslavia, Turkey, U.S.S.R.
echinus Edwards.	Jugoslavia, Turkey.
excrucians Walker.	Turkey, U.S.S.R.
flavescens Muller.	Danzig, U.S.S.R.
geniculatus Olivier.	Germany, Jugoslavia, Turkey, U.S.S.R.
lepidonotus Edwards.	Turkey.
mariae Sergent.	Balearic Is., Italy, Turkey.
pulchritarsis Rondani.	Jugoslavia, Turkey.
pullatus Coquillett.	Germany, Jugoslavia, U.S.S.R.
refiki Medjid.	Germany (Wurttemberg, *see* Martini 1930), Jugoslavia, Turkey.
rusticus Rossi.	Germany.
sticticus Meigen.	Germany, Jugoslavia.
vexans Meigen.	Germany, U.S.S.R.
vexans nipponii Theobald.	U.S.S.R. (Bikin R., Maritime Province, *see* Martini 1930).
Culex hortensis Ficalbi.	Greece, Turkey, U.S.S.R.
laticinctus Edwards.	Jugoslavia, Turkey.
martinii Medjid.	Jugoslavia (Metkovic, *see* Medjid 1930 and Martini 1930), Turkey.
mimeticus Noé.	Bulgaria, Greece, Italy, Jugoslavia, Turkey.
modestus Ficalbi.	U.S.S.R.
univittatus var. *perexiguus* Theobald.	Egypt, Italy, Turkey (for use of this name *see* Mattingly, 1954*a*.)

pipiens Linnaeus.	Turkey, U.S.S.R.
poicilipes Theobald.	Madagascar (paratypes of *C. auritaenia* Enderlein).
territans Walker.	Germany, Greece, Italy, Jugoslavia, Turkey (*apicalis auctt., see* Mattingly 1953).
theileri Theobald.	Greece, Italy, Jugoslavia, Turkey.
vagans Wiedemann.	China, Manchuria.

Acknowledgments.

My best thanks are due to Professor Weyer of the Tropical Institute at Hamburg and to Professor Martini and Dr. Laven, formerly of that Institute, for much personal kindness and hospitality and for invaluable aid in securing the permanent preservation of the historic material here described. My thanks are also due to Dr. B. P. Uvarov, who displayed a magical faculty for unravelling Russian data labels.

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A NEW *PROISOTOMA* (COLLEMBOLA) FROM KENYA.

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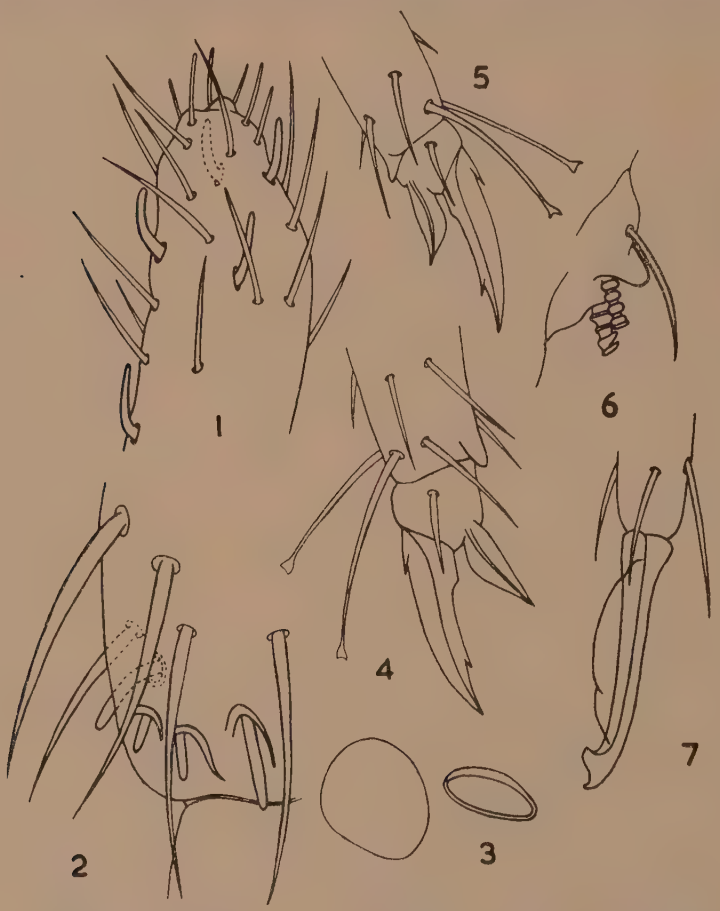
The new species described below is based on a small collection of Collembola made by Mr. B. Verdcourt at Kikuyu, Nairobi, and kindly passed on to me for identification by Miss T. Clay of the British Museum (Natural History).

Proisotoma caerulea sp. n. (Figs. 1–7.)

Colour.—Entirely deep blue with the ocellar fields black.

Clothing.—Moderate, of short simple setae becoming a little longer around the posterior. The manubrium with 10–12 posterior setae; posterior setae of each dens irregularly



Figs. 1–7.—*Proisotoma caerulea* sp. n. (1) Distal portion of Ant. IV from paratype. (2) Sense organ Ant. III from holotype. (3) Post-antennal organ and adjacent ocellus from holotype. (4) Hind foot from holotype. (5) Front foot from holotype. (6) Tenaculum from paratype. (7) Mucro and apex of dens from holotype.

(Fig. 2 × 1260 at the microscope, remaining figures × 500.)

arranged with a tendency to form both a basal and a distal group each containing 10–14 setae.

Body.—Length up to 1·1 mm. Antennae slightly longer than head, the four segments related as 19 : 28 : 28 : 40 ; Ant. IV at apex with sensory dome and 5–6 short, straight, slender sense rods ; subapically Ant. IV has 4–5 large, stout, curved sense rods interspersed among the setae. Ant. III with subapical sense organ consisting of a pair of short sense rods with a single longer sense rod on either side ; each sense rod arising from its own integumentary pocket. Ocelli eight to each side, the posterior inner two very small, remainder large, subequal. Post-antennal organ elliptical, double outlined, generally almost equal in length to the diameter of the adjacent ocellus but sometimes only about 0·75 as long. Rami of tenaculum each with four barbs, the corpus with one long stout seta.

Legs.—Claw with a pair of outer teeth about one-fifth down, a large inner tooth at two-thirds and at about one-quarter down the inner margin a distinct " step ". Unguiculus lanceolate, reaching to level of distal inner tooth, and with broad curved outer and inner lamellae. A long basal seta to each side of claw ; two long clavate tenent hairs, slightly shorter than claw, on each foot.

Furcula.—Manubrium to dens to mucro as 65 : 60 : 20 ; mucro elongate with small sharp apical tooth, larger blunt subapical tooth and central lamella which extends back from the base of the subapical tooth, almost to the mucronal base, and bears a nick about one-third back from its distal end.

KENYA : Kikuyu, Nairobi, in earth cracks.

Types.—Holotype in the British Museum (Natural History). Paratypes in the British Museum, Coryndon Museum, Nairobi, and the author's collection.

THE MALE OF *ANOPHELES* (*MYZOMYIA*) *DISTINCTUS* VAR. *UGANDAE* EVANS (DIPTERA : CULICIDAE).

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In April, May and July, 1939, *Anopheles* larvae were taken from clumps of short grass growing through clear water on the outer edge of the Nakasenji swamp, Jinja, Uganda. These were isolated individually in glass tubes and it was noted that the larvae, and the pupae derived from them, had the habit of creeping up the sides of the tubes for a distance of about 1 cm. above the surface of the water. Examination of the living larvae resulted in a provisional determination of the species as *Anopheles* (*Myzomyia*) *distinctus* var. *ugandae* Evans (a description of the aquatic stages of *A.* (*M.*) *wellcomei* Theobald had not then been published). Adults reared from this material, however, while generally resembling *A. distinctus* var. *ugandae*, show certain resemblances to the dark form of *A. wellcomei* recorded by Evans (1938) from Gaboon, Belgian Congo, Angola and Tanganyika. Thus, the proboscis and female palps are dark brown in colour, but the latter are very slightly paler at the distal end ; the hind tarsi of both sexes have distinct pale apical rings on the first *four* segments; the male genitalia, which have not previously been described in either *A. distinctus* var. *ugandae* or in the dark form of *A. wellcomei*, are indistinguishable from those of typical *A. wellcomei*.

It is difficult to say whether this material should be referred to var. *ugandae* or to the dark form of *A. wellcomei*. It seems possible that these names will later be considered as synonymous. Evans (1938) suggested that var. *ugandae* may eventually have to be regarded as a variety of *A. wellcomei* rather than of *A. distinctus*, but Lewis (1939) preferred to retain it in its present systematic position because of larval and pupal differences. (Unfortunately the larval and pupal pelts of the present material, together with all but five of the adults, have been lost and so cannot be compared with Lewis's description of the early stages of *A. wellcomei*). Disregarding larval and pupal differences, De Meillon (1947) considered var. *ugandae* to be more nearly related to *A. wellcomei* than to *A. distinctus*, because of the broad subapical pale band of the adult female palp. If the material described here is referable to var. *ugandae* then the form of the male genitalia lends strong support to De Meillon's view. I would be inclined to regard *ugandae* as a subspecies of *A. wellcomei*, but until more is known about the distribution of typical *A. wellcomei* and this dark form, it is, perhaps, better to leave it as a variety.

Acknowledgment.

I am much indebted to Mrs. E. C. C. van Someren, who kindly examined the genitalia of the three remaining males.

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DESCRIPTIONS OF TWO SPECIES OF *CULICOIDES* LATREILLE (DIPTERA : CERATOPOGONIDAE) NEW TO SCIENCE.

By

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AND

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During the course of work on the ecology of *Culicoides* larvae in Scotland, two species new to science have been found and are described in this paper. One of them, *Culicoides achrayi*, is a member of the *C. fascipennis* group, whilst the other, *C. duddingstoni*, belongs to the *C. pictipennis* group.

The main taxonomic features of the adult are its size, the colour pattern and trichiation of the wings, the thoracic markings and the male terminalia. The length of the wing has been taken as an index of size, and all measurements have been made on the intact dry mounted insect. For examination the male terminalia have been cleared in lactic acid and mounted in Euparal. The terminology throughout is that used by Edwards (1939) and, as in Edwards' work, the descriptions of the wings other than the measurements refer to the females. The larval and pupal descriptions have been based on those of Kettle & Lawson (1952).

Culicoides achrayi sp. n.

Male wing : Length 1·40 ± 0·16 mm. (Table I.)

Many macrotrichia present in cubital fork.

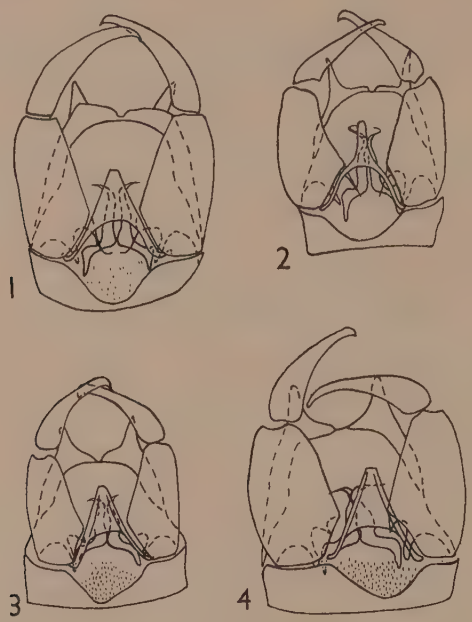
Female wing : Length 1·41 ± 0·05 mm. (Table I; fig. 5.)

Overall colour of wing dark grey, with two pale spots on front margin, of which the proximal one is the larger, and a rather indefinite pale band at the base. First pale spot extends from the costa across proximal half of first radial cell, surrounds the cross vein and ends just posteriorly to the median vein. Second pale spot on front margin of wing occurs at end of costa, and includes upturned part of vein r_{4+5}. Radial cells between the two pale spots darker than rest of wing. Base of wing pale and transverse band extends into anal area. Wing densely covered with macrotrichia, but basal cell bare. Halteres yellowish at the top.

Thorax greyish and unmarked. Anteriorly humeral pits show up as dark spots, and posteriorly the usual paired kidney-shaped patches are present, which appear dark under certain lighting conditions. Scutellum paler than rest of thorax, whilst abdomen is a darker grey.

Male terminalia (fig. 1) : Tergite with short thick divergent paired lateral processes ; posterior margin of tergite straight with small V-shaped notch in the midline. Sternite deeply emarginate, and the membrane covered with spicules, but not very densely. Coxite with a long thin ventral process directed anteriorly towards the mid-line. The precise shape of the ventral process is subject to individual variation, but it is always long and thin. Dorsal root finger-shaped and articulating with base of parameres, which is foot-shaped. Tips of the parameres directed laterally and rapidly narrow to a short point.

Aedeagus well chitinised, and roughly triangular in its posterior portion, with a well developed anterior margin.



FIGS. 1–4.—♂ terminalia of members of *C. fascipennis* group. × 150. (1) *C. achrayi* sp. n. (2) *C. cubitalis*. (3) *C. pallidicornis*. (4) *C. fascipennis*.

TABLE I.—*Wing Length of* C. duddingstoni *and the British members of the* C. fascipennis *group.*

Species.	Number of specimens. ♂	♀	♂ Wing length in mm. Mean ± 95 per cent. fiducial limits.	Range.	♀ Wing length in mm. Mean ± 95 per cent. fiducial limits.	Range.
C. pallidicornis .	10	10	1·24±0·05	1·13–1·33	1·29±0·07	1·20–1·47
C. cubitalis .	10	10	1·28±0·04	1·20–1·33	1·34±0·04	1·27–1·47
C. achrayi . .	4	8	1·40±0·16	1·30–1·50	1·41±0·05	1·30–1·47
C. fascipennis .	10	10	1·65±0·07	1·47–1·80	1·68±0·06	1·53–1·80
C. duddingstoni .	15	13	1·32±0·05	1·13–1·44	1·47±0·06	1·29–1·62

Holotype ♂, PERTHSHIRE: Loch Achray, Trossachs, bred from larva, 2.vii.1951/B.

Allotype ♀, same locality as type, bred from larva, 23.vii.1951.

Paratypes, same locality as type, 3 ♂, 5 ♀ bred from larvae during July, 1951; also 2 ♀, Blackwater, Trossachs, Perthshire, bred from larvae in July, 1951. ANGUS: Loch of Forfar, 1 larva, 4.ii.1952.

The type, allotype and 1 ♂, 5 ♀ paratypes have been deposited in the British Museum (Natural History).

1 ♂, 1 ♀ paratypes have been deposited in the United States National Museum, Washington, and the Canadian National Collection, Ottawa.

In the holarctic region the *C. fascipennis* group is represented by eight

TABLE II.—*Comparison of British members of* C. fascipennis *group.*

	C. pallidicornis.	*C. cubitalis.*	*C. achrayi.*	*C. fascipennis.*
Wing :				
Basal cell ♀	Bare.	Bare.	Bare.	Macrotrichia present.
,, ,, ♂	,,	,,	,,	At most 3 or 4 macrotrichia.
Cubital fork ♂	Almost bare.	Macrotrichia present.	Macrotrichia present.	Macrotrichia present.
Pale markings in association with cubital fork ♀	None.	Spot in cubital fork.	None.	Spot below fork of cubitus.
♂ Terminalia :				
Tergite margin. . . .	Deeply notched almost bifid.	Small median notch.	Small median notch.	Deeply notched almost bifid.
Membrane	Spiculate.	Bare.	Spiculate.	Spiculate.
Coxite ventral root . . .	Short.	Long and thin.	Long and thin.	Short.
Aedeagus body	Triangular.	Parallel-sided.	Triangular.	Triangular.
Parameres tips	Directed laterally, shortly tapering.	Hair-like, curled.	Directed laterally, shortly tapering.	Directed laterally, shortly tapering.

species, of which three are British, in addition to that described above. All these species (except *C. subfascipennis*) agree in having an unmarked thorax and a greyish wing with two not very conspicuous whitish spots placed each side of the darkened radial cells. The proximal spot is wider and surrounds the anterior cross vein, whilst the second spot is much smaller. *C. achrayi* can be distinguished from *C. fascipennis* by the absence of macrotrichia in the basal cell, and the fact that the proximal pale area does not extend below the cubital fork (Table II). In the male terminalia *C. fascipennis* can be recognised by the shape of the tergite and the length of the ventral root of the coxite (fig. 4).

In the female *C. achrayi* can be separated from *C. cubitalis* on the wing pattern, which has more extensive pale areas in *C. cubitalis* (Hill, 1947). In the male terminalia of *C. cubitalis* (fig. 2) the membrane is bare, and the paired processes on the tergite are much longer and narrower than those of *C. achrayi*.

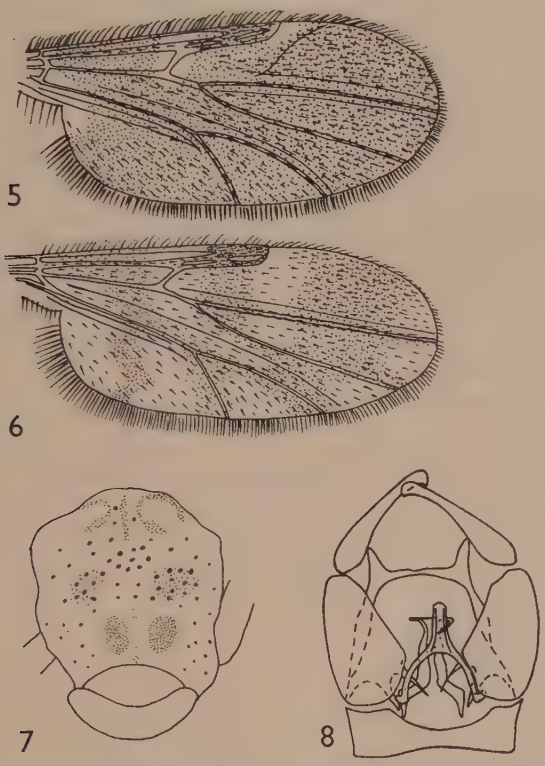
The females of *C. achrayi* and *C. pallidicornis* cannot be separated with certainty at the moment, as the wing markings of both appear to be identical. *C. achrayi* is larger than *C. pallidicornis*, but this difference is not sufficiently well marked to enable an accurate identification to be made (Table I). The males are readily separated as the male *C. pallidicornis* has no, or very few, macrotrichia in the cubital fork and the posterior margin of the tergite is deeply notched (fig. 3). *C. achrayi* can be distinguished from the Palestinian *C. tentorius* and *C. odiatus* on the colour of the thorax, which is cinnamon coloured in *C. tentorius*, and very dark brown in *C. odiatus*. In addition, the tergite on the male terminalia of *C. tentorius* is deeply notched. The greyish unmarked thorax of *C. achrayi* differentiates it from the European species, *C. susae*, in which the thorax is reddish-yellow, and from *C. subfascipennis*, the thorax of which bears three longitudinal stripes. In addition, *C. susae* is very small (length 0·8 mm.) and in *C. subfascipennis* the pale markings on the wing are more extensive.

C. achrayi is very closely related to the Nearctic *C. biguttatus*, in which Hoffman (1925) described thoracic markings, but he was uncertain as to their causation. Two females in the British Museum (reference, Baton Rouge, La., 13.iv.47 and 14.iv.47, taken at light, W. W. Wirth) have unmarked thoraces. The females of *C. biguttatus* and *C. achrayi* are at the moment inseparable. The male terminalia of these two species are very similar, but in the illustrations in Root and Hoffman (1937) the membrane is shown to be much more densely spiculate in *C. biguttatus* and the dorsal root of the coxite is represented as foot-shaped. There also appear to be small differences in the shaping of the margins of the tergite and sternite.

Fourth instar larva : Head 223 ± 9μ by 146 ± 7μ and 106 ± 4μ wide at oral ring (7 larvae measured) ; amber with dark brown mandibles, collar and oral ring. Head ratio 1·53 ± 0·09. *Epipharynx* (fig. 9) : dorsal comb about 32μ in width ; 7–10 teeth on each side, the third or fifth from the mid-line on each side conspicuously large. Second comb with 5–6 short triangular teeth. Third comb with 5–6 short teeth. Fourth comb with 15–18 short teeth.

Thoracic markings (fig. 13) : Prothorax with anterior transverse bar connected to paired antero-lateral bars. Mesothorax with anterior transverse bar and paired heavily pigmented lateral bodies. Metathorax with usual paired lateral bodies which are prolonged anteriorly and connect to an incomplete transverse bar. Additional scattered patches of pigment sometimes present in the antero-median portion of the prothorax and mesothorax.

Larvae of *C. achrayi* are easily confused with those of *C. pallidicornis* and *C. truncorum*, but from both of these it can be distinguished by its larger head. In addition, its epipharynx is different from that of *C. truncorum*, but inseparable from that of *C. pallidicornis*. Larvae of *C. achrayi* have been found in marshy ground in association with a permanent body of water (Loch Achray, Loch of Forfar), where they occur in association with *C. fascipennis*, *C. pulicaris* and *C. truncorum*.



FIGS. 5–8.—(5) Wing of ♀ *C. achrayi* sp. n. × 38. (6) Wing of ♀ *C. duddingstoni* sp. n.; × 38. (7) Thorax of ♀ *C. duddingstoni* sp. n.; hairs omitted. (8) ♂ terminalia of *C. duddingstoni* sp. n. × 150.

Pupa : 2·0–2·25 mm. long. Rather pale and some darkening on the back of the thorax. *Operculum* with black spinules distributed irregularly; blank posteriorly; a row of larger spinules laterally. *Horn* (fig. 11): uniformly greyish-brown except in very narrow pale area at tip and less dark area at base. Dark scales on all sides in proximal three-quarters only, a few laterally; 6 papillae at tip; a papilla at one sixth, at a half and at three-quarters.

Metathorax completely divided, the ends separated.

A.M. : Tubercle with large dark spine above the seta.

V.L. : A few ridges, no spines on the tubercle dorsal to the V.L.

Dorsals setae *i* and *ii* about equal.

L.P.M. : Tubercles in the fourth abdominal segment ridged; becoming slightly spined in the posterior segments; two well-developed spines on tubercles of eighth segment. Caudal spines black tipped.

Culicoides duddingstoni sp. n.

Male wing : Length 1·32 ± 0·05 mm. (Table 1.)

Female wing : Length 1·47 ± 0·06 mm. (Table I; fig. 6.)

Second radial cell entirely contained in a dark area ; two pale areas on front margin of wing, the proximal area includes most of the first radial cell and whole of anterior cross vein, and is continued distally as a narrow pale area between lower fork of median and upper fork of cubitus. Second distal pale area extends transversely across wing to lower branch of the median. Three pale areas present around wing tip, all of which reach wing margin. A similar pale spot in cubital fork and two pale bands in anal area, the proximal one of which extends over most of base of wing. Wing relatively hairy with macrotrichia in basal cell.

Mesonotum (fig. 7) : Covered with golden hairs, some of which have dark spots at their bases. In addition, some indistinct darkly pigmented patches present in middle of mesonotum. In the thorax illustrated only two of these are shown, the third, when present, situated in the mid-line slightly anterior to other two. Humeral pits dark with a certain amount of dark pigmentation around anterior face of mesonotum. Posteriorly, the usual paired kidney-shaped patches can be seen under certain conditions of lighting.

Male terminalia (fig. 8) : Tergite with paired divergent finger-like processes, and the posterior margin straight with a shallow indistinct median notch. Sternite shallowly emarginate ; membrane bare. Coxite with long thin ventral process. Aedeagus composed of narrow strongly chitinised arch bearing a median posteriorly-directed process, which is bluntly pointed. Parameres have long thin tips which are directed first laterally then ventrally, and finally towards the mid-line.

Female spermathecae composed of two spherical functional spermathecae and a narrow rudimentary one.

Holotype ♀, Midlothian : Duddingston Loch, Edinburgh. Bred from larva 17.vi.1953.

Allotype ♂, same locality as type. Bred from larva, 4.vi.1952.

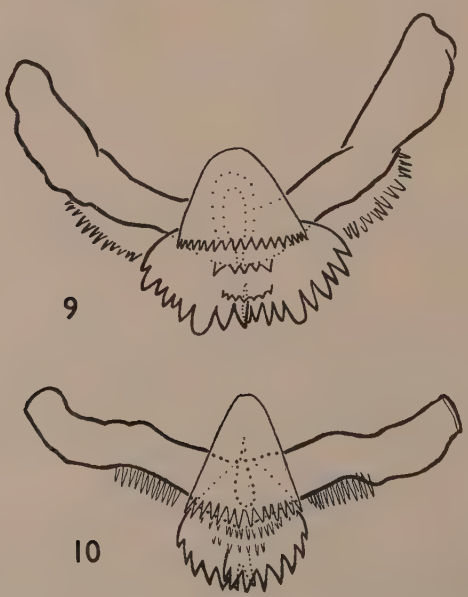


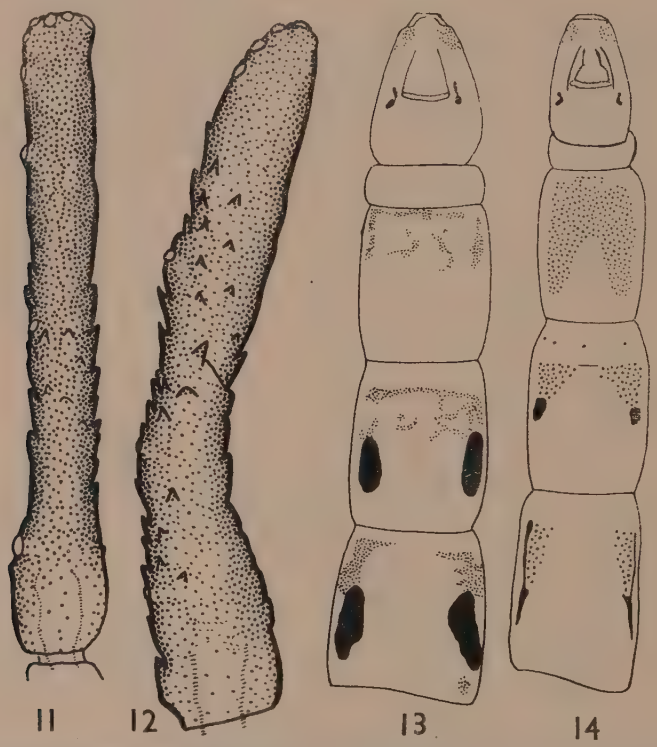
Fig. 9–10.—Epipharynx of (9) *C. achrayi* sp. n. × 860. (10) *C. duddingstoni* sp. n. × 860.

TABLE III.—*Comparison of the British members of the* C. pictipennis *group.*

	C. salinarius.	*C. circumscriptus.*	*C. odibilis.*	*C. duddingstoni.*	*C. pictipennis.*	*C. maritimus.*	*C. simulator.*
Thorax . .	Stippled.	Stippled.	Strikingly patterned.	Stippled.	Unmarked.	Unmarked.	Unmarked.
Wing :							
Second radial cell	Dark.	Dark.	Dark.	Dark.	Light.	Dark.	Dark.
Median fork							
proximal pale spot	Present reaches middle.	Present reaches middle.	Present at base.	Present near base.	Present near base.	Present reaches middle.	Absent.
distal pale spot	Well separated from wing margin.	Well separated from wing margin.	Reaches wing margin.	Reaches wing margin.	Reaches wing margin.	Almost reaches wing margin.	Reaches wing margin.
♀ Functional spermathecae	One.	One.	Two.	Two.	Two.	Two.	Unknown.
♂ Terminalia :							
Tergite margin median notch	Definite.	Definite.	Indistinct.	Indistinct.	Definite.	Indistinct.	Definite.
Sternite emargination	Deep.	Deep.	Moderate.	Moderate.	Shallow.	Moderate.	Shallow.
Membrane .	Spiculate.	Spiculate.	Bare.	Bare.	Bare.	Spiculate.	Bare.
Aedeagus body	Triangular.	Triangular.	Triangular.	Parallel-sided.	Narrowly triangular.	Narrowly triangular.	Parallel-sided.
Parameres :							
Tips tapering .	Gradually.	Gradually.	Gradually.	Gradually.	Rapidly.	Rapidly.	Very gradually.
Tips directed .	Posteriorly.	Posteriorly.	Antero-medially.	Medially.	Posteriorly.	Medially.	Posteriorly.
Coxite ventral root	Short.	Short.	Long.	Long.	Moderate.	Moderate.	Moderate.

Paratypes, same locality as type. 8 ♂, 3 ♀. Bred from larvae during May and June, 1952 ; 7 ♂ and 9 ♀ during June, 1953. The species has only been recorded from the type locality, where it is relatively abundant. The type, allotype and 11 ♂ and 8 ♀ paratypes have been deposited in the British Museum (Natural History). 2 ♂, 2 ♀ paratypes have been deposited in both the United States National Museum, Washington, and the Canadian National Collection, Ottawa.

The *C. pictipennis* group in Great Britain is composed of six species in addition to *C. duddingstoni* (see Table III). The thoracic pattern varies within the group. It is uniformly greyish in *C. pictipennis*, *C. maritimus* and *C. simulator*. *C. odibilis* has a very characteristic and extensively dark-patterned thorax. *C. salinarius* and *C. circumscriptus* have grey thoraces spotted with dark dots at the bases of the hairs. On thoracic pattern, *C. duddingstoni* is related to these last two species, but in addition they are characterised by having only a single functional spermatheca in the female, and the pale spots around the tip of the wing are well separated from the wing margin. In the male terminalia the membrane is spiculate, the ventral root of the coxite short, and the median notch in the tergite well developed.



Figs. 11–14.—(11–12) Pupal horn of (11) *C. achrayi* sp. n. × 430. (12) *C. duddingstoni* sp. n. × 430. (13–14) Thoracic markings of 4th stage larva of (13) *C. achrayi* sp. n. × 90. (14) *C. duddingstoni* sp. n. × 90.

C. duddingstoni agrees with the rest of the *C. pictipennis* group in having two functional spermathecae (these have not been examined in *C. simulator*,

which is a very rare species), and on the wing the apical pale spots reach the margin. *C. pictipennis* is unique in this group in having the second radial cell mainly pale. In *C. maritimus* the membrane is spiculate in the male terminalia and the ventral root of the coxite is moderately long. In *C. simulator* the ventral root of the coxite is also moderately long, but the membrane is bare.

In spite of the differences in thoracic pattern, *C. duddingstoni* has many features in common with *C. odibilis*. The wing patterns of both are similar, although in *C. odibilis* the dark background is much more intense. In the male terminalia of both species the ventral root of the coxite is long and thin, the membrane is bare, and the median notch of the tergite poorly developed. However, the parameres of *C. odibilis* are curled over laterally.

Fourth instar larva : Head : 192 ± 5μ by 119 ± 4μ and 81 ± 4μ wide at oral ring (63 larvae measured) ; pale straw-coloured head ; mandible, oral ring and collar light brown. Head ratio : 1·62 ± 0·05. *Epipharynx* (fig. 10) : Dorsal combs overlapping slightly in mid-line, width 20–23μ with overlap of 5–2μ ; 7 to 8 teeth on each side. Second and third combs both very thin and difficult to see ; second with at least 9 teeth ; third with a long row of about 20 teeth ; fourth comb with 14–20 teeth long and fine ; the sclerite rather triangular and about one and a half times as long as wide.

Thoracic markings (fig. 14) : Prothorax with a very broad pigmented band which leaves the postero-median region without pigment. Paired mesothoracic bodies extend antero-medially and often meet in the mid-line. Metathoracic bodies expanded anteriorly, but generally do not meet in the mid-line.

The larva of *C. duddingstoni* is very similar to that of *C. cubitalis*, with which it is associated, and from which it can be distinguished at once by its much larger head. The head size is very similar to that of *C. odibilis*, and larvae of *C. duddingstoni* may be confused with poorly marked *C. odibilis* larvae. However, in practice, the only confusion has been between *C. duddingstoni* and *C. cubitalis* when no measurements were made of head size. The pharynges of all three species are very similar and only differ in size.

The larvae of *C. duddingstoni* have only been found in the marshy area at the east end of Duddingston Loch, Edinburgh, where it is associated with the larvae of *C. cubitalis*, *C. pallidicornis*, and *C. odibilis*.

Pupa : 2·5 mm. long. Rather pale brown, darkest on back of thorax. Traces of pigment spots on abdomen, probably seen only in exuviae.

Operculum : Dark, irregularly spinulose except posteriorly ; a row of large spinules laterally on each side.

Horn (fig. 12) : Almost uniformly medium brown. Some sharp scales laterally ; more, larger and darker, scales on mesal face ; 7 papillae at the tip. A papilla at one-sixth, at one-third and two-thirds.

Metathorax : Completely divided, the ends separate and pointed. The tip of the scutellum parallel-sided and broadly rounded.

A.M. : The tubercle with a spine above the seta.

A.D. : The tubercle with a spine above the seta.

D.L. : The tubercle thumb-like ; seta *i* arising from the ventral edge, and not terminally.

V.L. : A spiny tubercle immediately above the V.L. tubercle.

Fourth Abdominal segment : Very few spinules anteriorly ; the usual pale nodules posteriorly.

L.P.M. : The tubercles two-spined in the fourth and subsequent segments.

Caudal spines : Dark tipped.

Alterations to Existing Keys to British Species of **Culicoides.**

Edwards' (1939) key to the females of British *Culicoides* can be modified to include *C. achrayi* and *C. duddingstoni*, as follows:

11 Wings with grey clouds on a pale ground; a dark spot in cubital fork 12
Wings with roundish pale spots on a dark ground; a pale spot in cubital fork 12A
12 Legs mainly blackish . . . . . **nubeculosus** Meigen
Legs pale . . . . . **riethi** Kieffer
12A Distal pale spot in median fork reaches wing margin; tips of median veins not pale . . . . . **duddingstoni** sp. n.
Distal pale spot in median fork does not reach wing margin; tips of median veins pale 13

---

17 Thorax brownish, scutellum paler 17A
Thorax dark brown, including scutellum . . . . . **odiatus** Austen
17A Pale spot in cubital fork visible when wing viewed obliquely against a dark background . . . . . **cubitalis** Edwards
No pale spot in cubital fork when so viewed
pallidicornis Kieffer (widespread)
achrayi sp. n. (uncommon)

The larval key of Kettle and Lawson (1952) can be modified as follows:

21 Head length about 245μ (239–252) 22
Head length about 225μ (214–232) . . . . . **achrayi** sp. n.
Head length about 200μ (194–210) 23

---

31 Prothoracic transverse band conspicuous, head length 191μ (185–197); living larva floats on water; dorsal comb 37μ wide
heliophilus Edwards
Prothoracic transverse band varies from faint to distinct; head length 166μ (162–170); larva sinks in water; dorsal comb 22μ wide
cubitalis Edwards
Prothoracic transverse band distinct; head length 192μ (187–197); living larva sinks in water; dorsal comb 20–23μ wide, overlapping
duddingstoni sp. n.

The pupal key of Kettle and Lawson (1952) may be modified as follows:

26 L.P.M. tubercles of fourth abdominal segment ridged and without spines 26A
L.P.M. tubercles of fourth abdominal segment spined 27
26A Back of thorax black, with small, irregular patches, as in *C. vexans*; rest of body brown, with grey shading . . . **C. simulator** Edwards
Thorax brown only; a few ridges, no spines on the tubercle dorsal to V.L. . . . . **C. achrayi** sp. n.

28 A pattern of five pigment spots in each abdominal segment. Horn uniformly brown or dark brown 28A
No pigment spots in abdomen. Horn unevenly pigmented . . 29

28A Horn dark brown. Tubercle above V.L. with ridges
C. fascipennis Staeger
Horn medium brown. Tubercle above V.L. with spines
C. duddingstoni sp. n.

Acknowledgments.

One of us (A. S. K.) wishes to thank the Secretary of State for Scotland for financial assistance.

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A NOTE ON *PARATYLANA* MELICHAR (FULGOROIDEA : ISSIDAE).

By R. G. Fennah, F.R.E.S.

In the writer's recent review of the classification of Issidae (Fennah, 1954) the differences in the concept *Paratylana* as interpreted by Melichar and Distant respectively were overlooked, and it is accordingly necessary to correct the resulting confusion.

Paratylana was proposed by Melichar (1906 : 198) as a subgenus of *Tylana* Stål, characterised by a tricarinate, obliquely descending frons and tegmina with an obliquely truncate apical margin and rounded distal angles. No type was designated, but the relevant part of the key in which the subgeneric name was quoted leads on to two species only, *T. constipata* Melichar and *T. laterata* Melichar, which therefore must be considered as the originally included species.

Three years later Distant (1909 : 78) proposed *Paratylana* as a new genus, citing *Issus herbidus* Walker as the type species and adding " the *Tylana laterata* Melich. will be included in this genus ". It would seem that Distant considered Melichar's segregate a taxonomically good genus, but one that had never formally been proposed. His action in citing *Issus herbidus* as the type, however, makes his concept congeneric with *Atylana* Melichar (in which Melichar had placed this species), while his name *Paratylana* becomes a primary homonym of *Paratylana* Melichar. *Issus herbidus* Walker not being an originally included species, cannot be made the type of *Paratylana* Melichar : *Tylana laterata* Melichar (1906 : 205) is here designated as the type species of *Paratylana* Melichar. It is an originally included species and has been figured.

The following corrections have to be made in the present writer's recent paper (1954). *Paratylana* should be credited to Melichar (pp. 461, 469), with citation of the logotype (p. 469). *Paratylana herbida* (Walker), its bibliographical citation, and all figure references to it, which include the last sentence on p. 469, should be transferred to follow *Atylana* Melichar (p. 470), and the generic name should be altered to *Atylana*. In its stead (on p. 469), *Paratylana laterata* Melichar should be substituted.

The descriptive matter in the key and the references to *Paratylana* on p. 466 and in the penultimate sentence on p. 469 refer to Melichar's concept based on *T. laterata* Melichar. In the key to Tonginae, couplet 37–38 on p. 461, the character of frontal proportions does not hold as a reliable means of separating *Atylana* from *Tylana*, and should be deleted.

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THE GENUS *TRICHOPSYCHODA* TONNOIR (DIPTERA: PSYCHODIDAE).

By G. H. Satchell, F.R.E.S.

(*The Museum, Dunedin, New Zealand.*)

Introduction.

In Tonnoir's classical paper on the genus *Psychoda* (1922) he created a subgenus, *Trichopsychoda*, for his species *Psychoda hirtella* (1919). This was raised to generic status by Edwards (1940), and up to 1953 the genus was known only by the type species. The subgenus was created to receive those species which fulfilled the diagnosis of *Psychoda* Latreille (Tonnoir, 1922) and had, in addition, hairs on the wing membrane as well as on the veins; the generic diagnosis has never been elaborated more critically than this. In 1953 a second species of the genus was described from Australia (Satchell, 1953), and since then I have seen five other species—two from Malaya, one from South Africa, one from Madeira and one from central Europe. It is the purpose of this paper to describe these new species, and to devise a new generic diagnosis based on the wider array of species now available.

Tonnoir's definition of this genus has become unsatisfactory largely because the description of many new species of *Psychoda* has rendered the existing definitions of that genus inexact. It is not intended here to re-define the genus *Psychoda*, but when this is done, some mention will have to be made of the simple spatulate retinaculae in the male. Though not confined to this genus, almost all members of it possess them. The genus *Trichopsychoda*, however, has four of its species with from 1–4 spatulate retinaculae, the other three having from 2 to many bell-like retinaculae. In this feature, and in the hairy wing membrane they recall the primitive African *Brunettia*-like forms, such as *B. splendens* Tonn., rather than the more advanced *Psychoda*. That they are related to, and may have given rise to the genus *Psychoda* is indicated by the possession by both of certain features found nowhere else. The 13th antennal segment lacks a neck and encloses the diminutive terminal segments, within its own verticil. The ascoids are Y-shaped or, exceptionally, some simple modification of this. (In the subgenus *Threticus* Eaton one branch of the Y is lost, and in such species as *Psychoda pusilla* Tonn., there is an extra anterior branch). The possession of diminutive terminal flagellar segments, formerly thought to be peculiar to *Psychoda*, is now known to be common to certain undescribed South African species of *Telmatoscopus* Eaton, but in such cases the 13th segment still has a well developed neck, and the diminutive segments are thus outside its verticil. Moreover their ascoids are simple or branched, but never Y-shaped. In addition to the features possessed by *Psychoda* and *Trichopsychoda* alone, the wing venation, in which the ending of R5 at the wing tip is coupled with the radial fork being well after the medial, provides a feature which is universal in the two genera but occurs very occasionally in the genus *Telmatoscopus*. Their similarity in these features inevitably suggests that the genus *Psychoda* was derived from a *Trichopsychoda*-like ancestor by

the loss of the hairs on the wing membrane, and the further simplification of the genitalia. Even within the genus *Trichopsychoda* stages in the transition from *Brunettia*-like genitalia to *Psychoda*-like genitalia may be observed. *T. africana* sp. n. has numerous bell-like retinaculae, *T. hirtella* has ten bell-like and six spatulate retinaculae, *T. montana* Sat. has only two bell-like retinaculae. These three species, in addition, have the radial and medial forks incomplete. *T. flavithorax* sp. n. has four spatulate retinaculae, *T. mayeri* sp. n. two and *T. maderensis* sp. n. one. In addition, in *T. mayeri* the parameres are reduced to simple blades flanking the symmetrical aedeagus and constituting a type of genitalia very similar to those of *Psychoda* (*Philosepedon*) *humeralis* Meig. Species of the subgenus *Philosepedon* Eaton show further resemblances to *Trichopsychoda* in that the anterior arms of the ascoids are swollen and not much curved.

The scattered distribution of the genus *Trichopsychoda* with one species in Australia, one in South Africa, one in Madeira, two in Malaya and two in Europe is indicative of an archaic rather than a recent genus. It contrasts strongly with that of *Psychoda*, which is the dominant genus of the family, and has numerous species in every zoogeographical region. It is tentatively suggested that these species of *Trichopsychoda* are the scattered survivors of an early offshoot of the hairy winged *Brunettia*-like stock that also produced our present-day species of *Brunettia*. By the reduction in the number of retinaculae and a loss of the hairiness of the wing membrane it has led, through species like *T. mayeri* and *T. maderensis*, to species like those at present placed in the subgenus *Philosepedon*, and from these to the vast assemblage of the present-day species of *Psychoda*.

Trichopsychoda Tonnoir, 1922.

Tonnoir, A. L., 1922, *Ann. Soc. ent. Belg.* **62** : 59.

Psychodinae with 15–16-segmented antennae, flagellar segments flask-shaped with basal bulbs and apical necks, 13th lacking a neck ; terminal two or three segments diminutive, subspherical, enclosed within the verticil of the 13th ; ascoids Y-shaped in pairs on segments 3–13.

Wing with R5 at wing tip, radial fork sometimes incomplete, always after medial fork and after middle of wing ; wing membrane as well as veins evenly covered with a vestiture of fine hairs.

Hypopygium with cercopods bearing bell-like, fringed, or spatulate retinaculae.

Type species : *T. hirtella* Tonnoir, 1919.

Trichopsychoda hirtella (Tonnoir).

Tonnoir, A. L., 1919, *Ann. Soc. ent. Belg.* **59** : 15.
Tonnoir, A. L., 1922, *Ibid.* **62** : 60–61.

This species has been recorded from Britain and the Continent. Tonnoir's 1922 account gives satisfactory figures of it.

Location of type unknown.

Trichopsychoda montana Satchell.

Satchell, G. H., 1953, *Aust. J. Zool.* **1** : 391–2.

This species is known from New South Wales and Tasmania, and differs from the type species chiefly in the reduced number of bell-like retinaculae.

Type : School of Public Health and Tropical Medicine, Sydney.

Trichopsychoda africana sp. n.

A uniformly ochraceous-grey species closely related to the type species but with the style bifurcated.

Male.—Eye bridges 4 facets wide, almost touching. Antenna 16-segmented, 1·8 times as long as wing width ; scape scarcely longer than wide (fig. 1, A), flagellar segments with slightly eccentric bulbs, the necks longer than the bulbs, the last three segments diminutive, subspherical, well separated ; ascoids Y-shaped, the anterior arms not noticeably broadened. Palpi not investigated.

Thorax with an ochraceous-grey vestiture. Wing (fig. 1, B) 1·9 mm. long, 2·7 times as long as wide, radial and medial forks incomplete ; origin of R2 + 3 at apex of basal cell ; erect hairs extending along R2 and R4 almost to level of inner end of M2, present on bases only of M1, M3 and Cu ; wing membrane with an ochraceous-grey vestiture. Legs unicolorous.

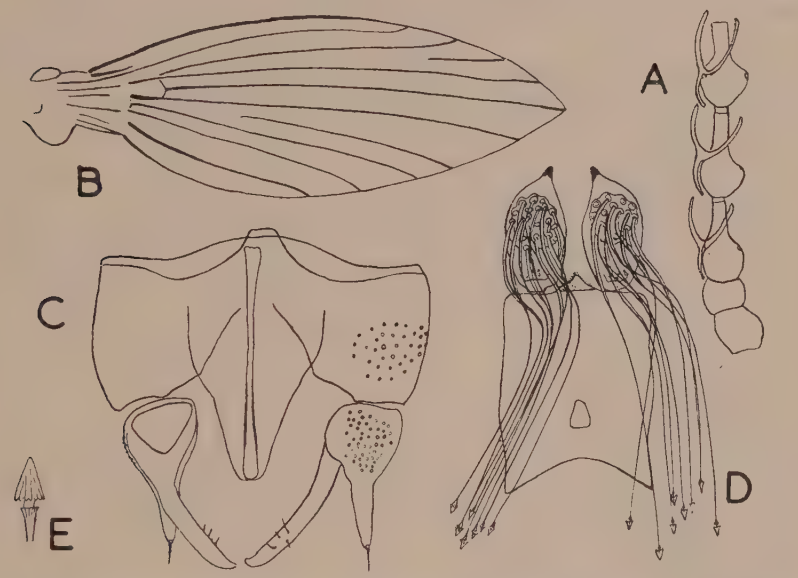


FIG. 1.—*Trichopsychoda africana* sp. n. A. Base of antenna. B. Wing. C. Hypopygium. D. Ninth tergite and cercopods. E. A retinaculum.

Hypopygium (fig. 1, C) with 9th sternite expanded into two lateral flaps, coxite as long as wide ; style bifurcated, consisting of a long blade-like portion curving medially, and a shorter tapering portion, ending in a short seta ; lateral tuft of deciduous hairs on style well developed ; aedeagus a simple rod invested in a broadly conical envelope ; cercopod (fig. 1, D) short, almost cylindrical, 0·7 times as long as 9th tergite, which is a rectangular plate ; each cercopod bearing a dorsal raised circular area from which arises 20 or so long hair-like retinaculae with characteristic tips (fig. 1, E).

Holotype and 2 ♂ paratypes, NATAL : Town Bush, Pietermaritzburg, 28.v–7.iv–26.v.1953. (*G. H. Satchell*). Type in the British Museum (Nat. Hist.).

Town Bush is an area of mixed indigenous and introduced trees, near Pietermaritzburg. The specimens were all collected by sweeping near the stream in Town Bush.

This species resembles the type species in the conformation of the retinaculae; the portion of the style bearing the short seta at its tip closely resembles the whole of the style of *T. hirtella*. It is the medially directed process of the style that distinguishes this species so strongly from *T. hirtella*.

Trichopsychoda flavithorax sp. n.

A large brown species with a golden-yellow thorax and a wing mottled in light and dark brown.

Male.—Tuft of erect brown squamose hairs on frons; eye bridges separated by width of 2 facets. Antenna 1·3 times as long as wing width; verticils closed, scape 1·4 times as long as broad, basal flagellar segments with neck equal to bulb, slightly longer than bulb in medial segments; segment 14–16 (fig. 2, A) diminutive, subspherical, distinctly separated; a small sensory cone on 15; ascoids (fig. 2, B) Y-shaped, the anterior arms rather swollen at the base. Palpal formula 1 : 2 : 2·5 : 2·7.

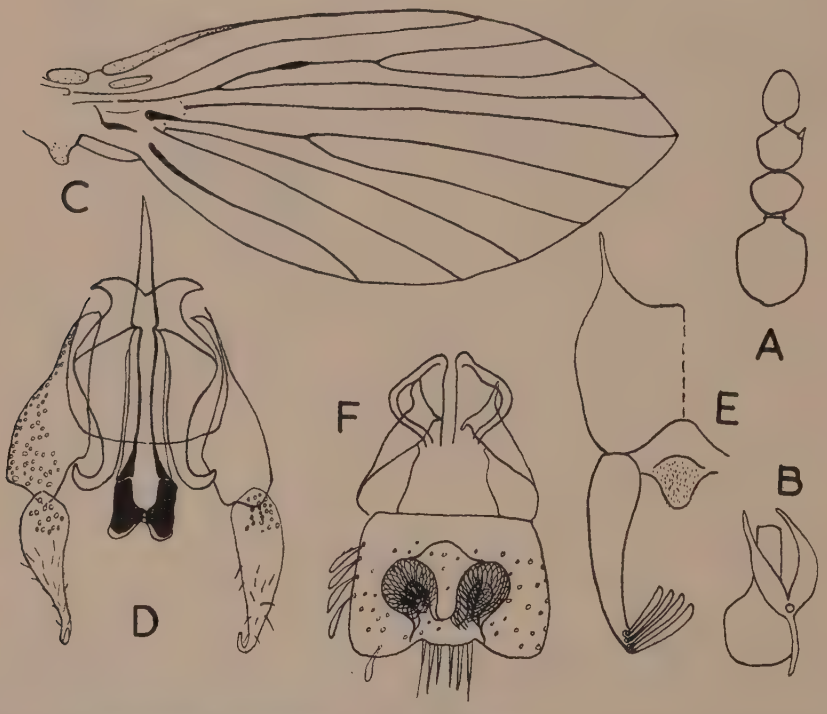


Fig. 2.—*Trichopsychoda flavithorax* sp. n. A. Tip of antenna. B. A medial antennal segment. C. Wing. D. Hypopygium. E. Ninth tergite and cercopod. F. Subgenital plate.

Thorax with a dense hairy vestiture, light yellow at the edges shading to an orange brown in the centre. Wing (fig. 2, C) 2·3 mm. long, 2·3 times as long as wide, radial fork above tip of Cu. Costal callus bearing a long yellowish-brown tuft lying along costa or even on wing membrane itself; wing vestiture brown, mottled with patches of lighter yellow to yellow-brown hair, notably at base, transversely across the wing disc in the

middle, and in patches behind the tips of R3, R4, M1, M2 and M3 ; erect hairs on stem of radial fork, forming a distinctly darker tuft half way along that vein, which is thickened at this point (fig. 2, c) ; erect hairs also on R4, M1 + 2, M3 and Cu in basal half of wing. Wing membrane evenly and densely hairy, fringe yellow-brown and unicolorous. Legs brown with a golden reflection.

Abdomen with a vestiture of brown decumbent scales. *Hypopygium* (fig. 2, D) with the 9th sternite in the form of a simple transverse band ; style shorter than coxite, hooked at tip ; aedeagus ending in a heavily sclerotised squarish piece, bifid at the tip ; parameres curved and hooked at the tip ; cercopod (fig. 2, E) swollen a little at the base and tapering gently to the tip which bears 4 spatulate retinaculae ; anal valve as in fig. 2, E.

Female.—Similar to male, but subgenital plate rectangular (fig. 2, F) invaginated on inner face to form paired capsules with elaborate curling sculptured markings ; spermathecae as in fig. 2, F ; ovipositor short.

Holotype, allotype and 4 ♂, 4 ♀ paratypes, MALAYA : Pahang, Fraser's Hill, 4200 ft., 4.vii.1931 and other dates.

Paratype ♂, MALAYA : Perak, Larut Hills, 4500 ft., 18.ii.1932.

Paratype ♂, MALAYA : Selangor, Bukit kutu, 3500 ft., 9.ix.

All collected by *Mr. H. M. Pendlebury.*

Type in the British Museum (Nat. Hist.).

This is the only patterned and coloured species so far described. The intensity of the colouring varies in the different specimens, and is probably more intense in fresh material.

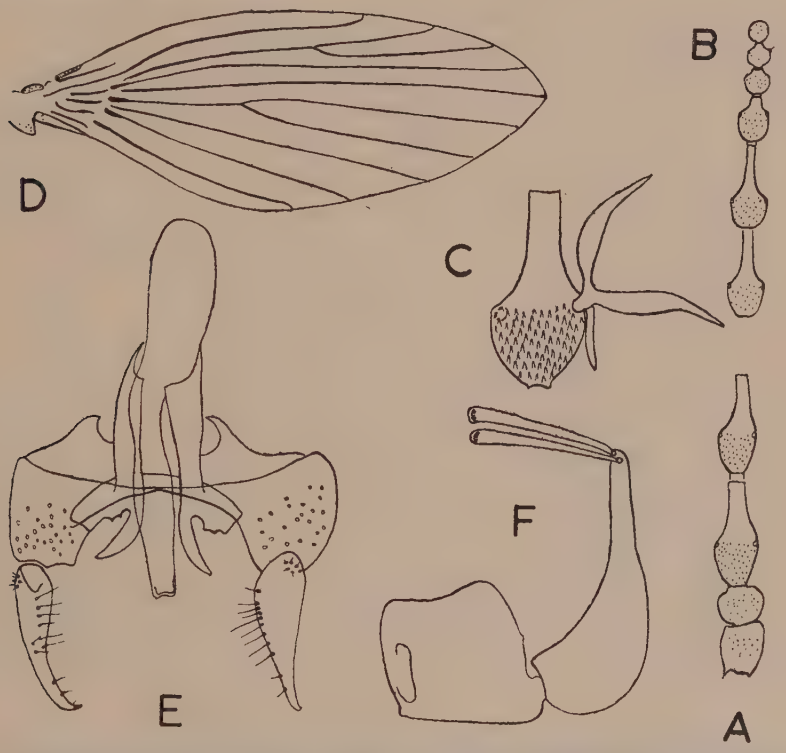


FIG. 3.—*Trichopsychoda mayeri* sp. n. A. Base of, B. tip of antenna. C. A medial antennal segment. D. Wing. E. Hypopygium. F. Cercopod.

Trichopsychoda mayeri sp. n.

A uniformly ochraceous-grey species.

Male.—Eye bridges 4 facets wide, separated by width of half a facet. Antenna 1·9 times wing width, 16-segmented, scape (fig. 3, A) a little longer than wide; flagellar segments with necks a little longer than bulbs, terminal 3 segments (fig. 3, B) diminutive, subspherical, well separated; ascoids Y-shaped with rather swollen anterior arms (fig. 3, C). Palpal formula 1 : 1·7 : 2 : 2·3.

Thorax with grey hairy vestiture. Wing (fig. 3, D) 2·3 mm. long, 2·4 times as long as broad, radial fork after medial, R2, R3 and R4 rather crowded together; wing membrane evenly covered with ochraceous-grey hairs. Legs unicolorous.

Hypopygium with style (fig. 3, E), a little longer than coxite, swollen basally, slightly curved, the tip more sharply bent and more densely sclerotised; lateral tuft of deciduous hairs reduced to six minute ones; a ventral and a medial row of longer sensory setae; aedeagus symmetrical (turned sideways in fig. 3, E), cylindrical, bluntly tipped, flanked by lateral, outwardly directed, pointed parameres; cercopod (fig. 3, F) 1·8 times as long as 9th tergite, swollen basally and gently tapering to an almost parallel-sided apex bearing two spatulate retinaculae 0·6 as long as the cercopod; anal valve with a slightly convex posterior margin.

Holotype male (only specimen), AUSTRIA: Hammern, Mik. 12.vii.1873. Type in the collections of the Naturwissenschaftlichen Museums, Vienna.

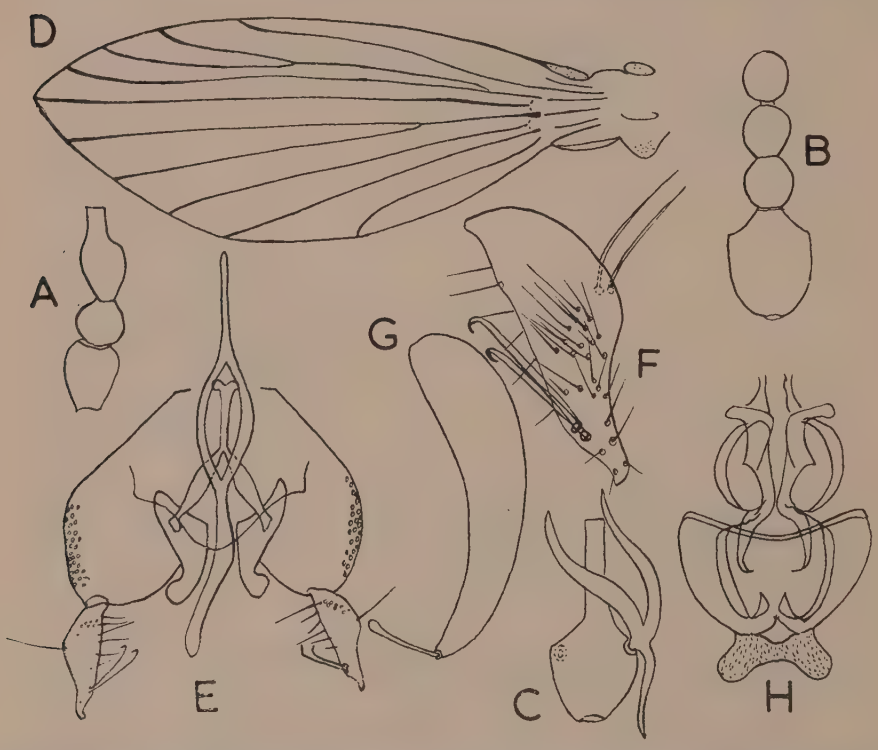


FIG. 4.—*Trichopsychoda malayensis* sp. n. A. Base of, B tip of antenna. C. A medial antennal segment. D. Wing. E. Hypopygium. F. Style, lateral view. G. Cercopod. H. Subgenital plate.

The specimen bears a Tonnoir identification label " *Trichopsychoda* sp., near *hirtella* " and is undoubtedly the one mentioned by him (1922 : 59).

I am naming the species after Dr. Helmut Mayer whose kindness in letting me examine the Psychodidae in the Vienna Museum I would like to acknowledge.

Trichopsychoda malayensis sp. n.

A large uniformly brown species with the abdomen covered with scales.

Male.—Eye bridges 4 facets wide, separated by a width of 2·5 facets. Antenna 1·4 times as long as wing width, scape (fig. 4, A) 1·4 times as long as wide ; verticils closed, flagellar segments with neck equal to bulb, slightly longer than bulb in more medial segments (fig. 4, C), segment 13 (fig. 4, B) with no neck, 14–16 diminutive, subspherical, with sutures between, ascoids Y-shaped, the anterior arms rather thick. Palpi scaly, formula 1 : 2 : 2·2 : 2·1.

Thorax with a dense hairy vestiture, dark brown in colour. Wing (fig. 4, D) 2·8 mm. long, 2·6 times as long as broad ; vestiture uniformly dark brown ; erect hairs extending along R2 + 3 to fork, almost to this level on R4, up to fork on M1 + 2 and almost to this level on M3 and along whole length of Cu. Wing membrane evenly and densely hairy, fringe unicolorous. Legs unicolorous.

Abdomen densely covered with shining decumbent brown scales. *Hypopygium* with 9th sternite shaped as in fig. 4, E ; coxite large and rather bulbous ; a dense tuft of squamulose hairs present laterally ; style very short (fig. 4, F) slightly hooked at tip, bearing numerous long, anteriorly pointing hairs and two strong hairs hooked at the tip ; aedeagus

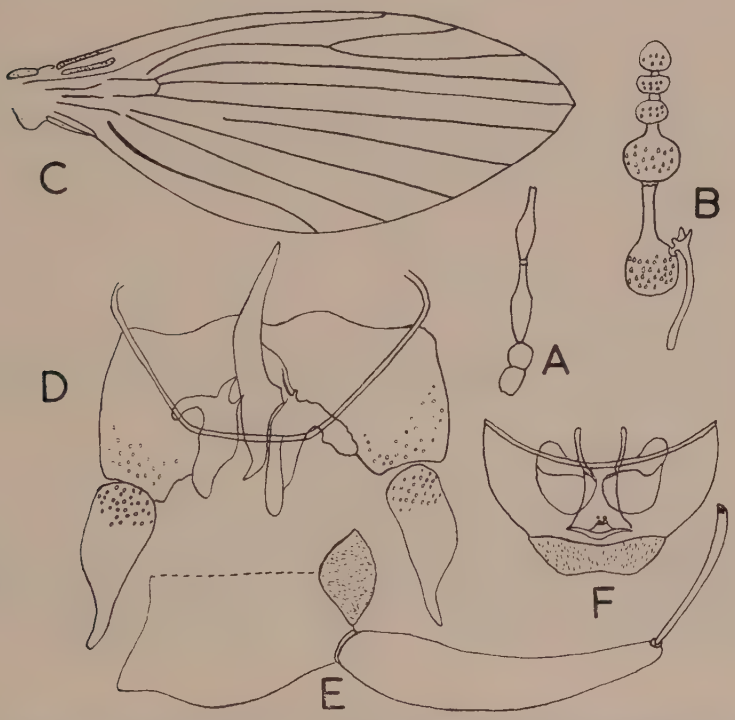


FIG. 5.—*Trichopsychoda maderensis* sp. n. A. Base of antenna. B. Tip of antenna (enlarged). C. Wing. D. Hypopygium. E. Ninth tergite and cercopod. F. Subgenital plate.

simple, symmetrical, flanked by lateral parameres with which it is connected by diverging rods; cercopod (fig. 4, G) twice as long as 9th tergite, both structures densely scaled; the retinaculum single and spatulate; anal valve with a semicircular outline.

Female.—Similar to ♂; subgenital plate as in fig. 4, H, with a low conical genital digit.

Type, allotype and 3 ♂, 2 ♀ paratypes and six other specimens, MALAYA: Pahang, Fraser's Hill, 4200 ft., 26.v.1926 and other dates (*Mr. H. M. Pendlebury*).

Type in the British Museum (Nat. Hist.).

Trichopsychoda maderensis sp. n.

A uniformly ochraceous species.

Male.—Eye bridges 4 facets wide, touching. Antenna 1·6 times wing width, 16-segmented, verticils rather open; scape (fig. 5, A) and pedicel subequal, scarcely longer than wide, basal flagellar segment elongate, neck not quite as long as bulb, subsequent segments with bulb more nearly approaching a spherical shape (fig. 5, B), segments 14–16 diminutive, distinctly separated; ascoids (fig. 5, B) with very short anterior arms and a long posterior arm. Palpal formula 1 : 2 : 2·4 : 2·9.

Thorax with an ochraceous hairy vestiture. Wing (fig. 5, C) 2·6 mm. long, ovolanceolate, with a rather flattened anterior margin, 2·5 times as long as wide; origin of R2 + 3 before apex of basal cell, medial fork very loosely connected, nearer to basal cell than to level of radial fork. Vestiture uniformly ochraceous, hairs on wing membrane as well as on veins; erect hairs squamose and very prominent, absent on R1, R5, M2 and M4, extending thickly along R2 + 3 to just beyond the fork, and then sparsely along R2 almost to the tip, and along M1 and M3 to level of tip of M4. Legs unicolorous.

Abdomen with hairy vestiture. *Hypopygium* (fig. 5, D) with coxite a little longer than wide, style narrowing abruptly in apical third to a straight finger-like tip. Aedeagus consisting of a median element with a pointed tip bent at an angle, flanked on both sides by irregularly shaped parameres that are heavily sclerotised and have their bases applied along the inner faces of the coxites. Cercopod (fig. 5, E) elongate, 1·8 times as long as the 9th tergite, gently tapering and not swollen at the base, terminating in a single spatulate retinaculum 0·4 times as long as the cercopod; anal valve with a rounded outline.

Female.—Similar to male, the erect hairs on the wing not squamose and not so noticeable; subgenital plate with an undivided hairy lobe; spermathecae as in fig. 5, F.

Type, allotype, and 8 ♂, 6 ♀ paratypes, MADEIRA: Rabaçal, 29.iv.1904 (*Rev. A. E. Eaton*).

The type and other specimens are in the Eaton collection of Psychodidae, in the British Museum (Nat. Hist.). The name used above was originally suggested by Eaton.

SUMMARY.

The genus *Trichopsychoda* Tonnoir, 1922, is re-defined and its position discussed. It is suggested that the genus may resemble the ancestors of the genus *Psychoda* and that it is an early off-shoot from a primitive *Brunettia*-like stock. Five new species are described: *T. africana* (S. Africa), *T. flavithorax* (Malaya), *T. mayeri* (Central Europe), *T. malayensis* (Malaya) and *T. maderensis* (Madeira).

ACKNOWLEDGMENTS.

I am indebted to Mr. Paul Freeman, of the Entomology Department British Museum (Natural History), and to Dr. Helmut Mayer of the Vienna

Museum, for permission to study the Pshychodidae collections in their charge. I would also like to thank Professor S. Bush, for accommodating me in the Zoology Department, University of Natal.

References.

Edwards, F. W., 1940., *Trans. Soc. Brit. Ent.* **7** : 61.
Satchell, G. H., 1953, *Aust. J. Zool.* **1** : 357–418.
Tonnoir, A. L., 1919, *Ann. Soc. ent. Belg.* **59** : 15.
——, 1922, *Ibid.* **62** : 49–88.

Book Notice.

Insects of Micronesia. Vol. I. *Introduction.* By J. L. Gressitt. Pp. viii + 257, map, 70 figs. Honolulu (Bernice P. Bishop Museum), 1954. Price $3.50.

This part is the introduction to a series with more than 115 authors, each a specialist who will cover a limited portion of the terrestrial arthropod fauna of Micronesia (in the broad sense).

The introduction describes the environment of Micronesia as it relates to insects with emphasis on the geography and vegetation. There are also brief discussions on the geology, climate and history of the islands and the means of transport across the water. There is also a section on ecology of atoll and high island insects.

A section is devoted to the principal records of insects of economic importance in Micronesia ; these have not previously been assembled and some records have only appeared in reports with very limited circulation.

The illustrations comprise excellent maps of most of the principal islands, maps of the island groups and many half-tone reproductions of photographs which convey very clearly the ecological conditions.

This series, together with the already published faunas of the oceanic Pacific islands, including the " Fauna Hawaiiensis " (Perkins *et alt.* 1900–1913), " Insects of Samoa " (Buxton, Hopkins *et alt.* 1927–1935), " Marquesan Insects " (Adamson, Mumford *et alt.* 1932–1939), " Society Islands Insects " (*Bull. Bernice P. Bishop Mus.* **113**, 1934), " Insects of Hawaii " (Zimmerman, 1948) and " Insects of Guam " (Swezey *et alt.*, 1942, 1946) should ultimately produce one of the best documented arthropod fauna records available, a remarkable work for so large a geographical area.

NOTES ON SOME AFRICAN SPECIES OF *LIGYRA* AND *EXOPROSOPA* (DIPTERA : BOMBYLIIDAE).

By S. J. Paramonov.

The study of material in the British Museum has given the author an opportunity to make additional notes on species of *Ligyra* and *Exoprosopa* and to describe one new species of *Exoprosopa*. The description of *Ligyra paris* Bezzi is extremely short; Bezzi had intended to describe the species in full in his memoir on the Bombyliidae of the Budapest Museum. After his death his manuscript was missing, and as result we have only three lines of description for this species. A full description is given in the present paper.

Ligyra thyridophora (Bezzi) **comb. nov.**

Up to the present only the female of this species was known (two specimens). I have before me 1 ♂ from Makueni, Ukamba, v.1947 (*van Someren*); 1 ♀ from Kikuuni River, ii.1947 (*van Someren*); 1 ♀, 22.xii.1933, Tkotos (*Miss M. Steele*), "from low land grass and thorn bushes", (*Sudan Govt.*).

All three specimens with a very similar wing pattern (Bezzi, fig. 42), but boundary of black in basal part of first submarginal cell does not reach apex of discal cell and base of second submarginal cell, and does not make an angle, but runs straight from the first longitudinal vein to the discal cell. Vertex in male equal to one-seventh of head width, in female one-sixth. The reddish scutellum of female a little darker in male. Proboscis exactly as long as mouth opening (in Bezzi's specimens considerably shorter than mouth opening). Underside of male, which is in good condition, clothed densely and uniformly with yellowish-whitish hairs. Hind border of first tergite in male with very narrow yellowish transverse band, on anterior border of the third another broader band (the abdomens in the two females are rubbed); scales on other tergites not forming distinct bands. Claws short, nearly half the length of last segment of tarsi, nearly straight. Hairs on sides of abdomen rather dense and long, particularly on first segments.

The author does not think that the small differences from the description given by Bezzi are of subspecific value; the typical form is still imperfectly known.

Length of body: ♂, 19 mm.; ♀ (Kikuunir), 16 mm.; ♀, 18·5 mm.

Length of wing: ♂, 20 mm.; ♀, 17 mm.; ♀, 19·5 mm.

Ligyra helena (Loew) **comb. nov.**

A single female in good condition is before me which I think it necessary to describe in some detail.

Ground colour of frons and face yellow, ocellar area and occiput dark. Basal two segments of antennae yellow, the third darkened, conical, nearly equal to the basal two segments together, its style short, nearly one-sixth length of the segment itself. Face in profile very protruding, rectangular, not rounded. Palpi yellow; proboscis dark. Whole head covered with dense golden-yellow hairs and scales, particularly bright-golden are the scales on the hind border of the eyes. Vertex nearly equal to one-sixth of head width.

Thorax black, with greyish nuance on anterior part, but covered with very small velvet-black scales. Ground colour of scutellum brownish, scales, however, being deep black.

Entire underside of thorax covered with dense and long bright golden-yellow hairs, similar hairs on anterior and lateral borders of mesonotum. Legs bright yellow, spinules black. Halteres yellow, the knob darker; bristles on mesonotum and scutellum long, black. Wings comparatively short and very broad in area of tip of anal cell. Vein r–m situated on middle of discal cell. Apex of discal cell very acute; first posterior cell narrowed in its basal part. The vein between second and third posterior cells very long, and slightly S-shaped. Axillar cell very broad, nearly 1·5 times as broad as anal cell. Dark colour of the wing extremely intense and uniform, with very strong violet and purple reflections.

Larger part of upper side of abdomen occupied by an extremely sharply developed deep-black triangle, base being sides of the scutellum, and apex the middle of the hind margin of the sixth tergite. Seventh tergite and outer parts of abdomen with bright golden scales. Boundary between deep-black and golden scales quite straight and sharp. Hairs on sides of tergite bright yellow. Underside of abdomen yellowish, with golden yellow hairs.

1 ♀, Diani, xii.1945 (*van Someren*).

Ligyra sisyphus Fabricius.

Black bristles on mesonotum and scutellum very strong, long and numerous. On humeral calli there are also numerous black bristles, but much shorter. Ambient vein on alula deep black; squama of wings yellowish. Scutellum reddish-brown. Metapleural tuft and plumula very long, dense, whitish.

1 ♂, v.1947, Makueni, Ukamba (*van Someren*).

Ligyra paris (Bezzi) **comb. nov.**

Bezzi's diagnosis is as follows: "Very nearly allied to and closely resembling a small form of *H. vittata* Ric., but differing in the discoidal cell being more elongate and acute at the base.

"*H. paris* is described, from a specimen from Erythraea, in my memoir on the Bombyliidae of the Museum at Budapest. There are in the British Museum a couple of examples from Kenya Colony, x.1911 (*R. J. Stordy*); a ♂ from S. Nigeria: Ibadan, 7.xii.1913 (*Dr. W. A. Lamborn*) also seems to belong here."

Ground colour of head reddish, on upper part of occiput and in the ocellar area dark. Antennae reddish; third segment conical, with a long, very thin style which is a little shorter than the third segment, but longer than the basal two segments together. Hairs on both these segments black, short. Frons and face with sparse, yellowish hairs and more numerous black hairs, which on frons are erect, on face more declined. Face in profile prominent, triangular, but not very acute. Hairs at mouth cavity reddish. Proboscis a little longer than mouth cavity. Occiput nearly bare, with very small yellowish scales at hind border of eyes. Vertex in male three times as broad as ocellar tubercle and about one-seventh of head width, in female a little broader.

Ground colour of mesonotum dark, of scutellum reddish, the underside of thorax predominantly reddish. Hairs on mesonotum yellowish, at sides and on anterior margin much denser, longer and brighter; in disc intermixed with not very numerous, short black hairs. Bristles on mesonotum and scutellum black; bristle-like hairs at sides on anterior part also black (the yellow hairs inwards from these bristle-hairs have a more reddish tint). Underside of thorax with dense and long reddish-yellow hairs on anterior part. Legs reddish; last four segments of tarsi blackish. Anterior tibiae without spicules. Bristles on all femora and mid- and hind tibiae black, hairs on coxae black, mixed with yellow ones. The tuft above hind spiracle very dense, bright yellow, long. Halteres yellow.

Wings intensely yellow-brown the colour being rather uniform, but small darker spots (6–10) present at connection points of veins. Alula dark, fringed with brown scales. Squama alaris bright-yellow, with similar long scales. Venation very characteristic. Vein terminating the discal cell S-shaped, with general direction nearly parallel to hind margin. Cross-vein r–m is placed a little beyond middle of discal cell, very long; the "upper vein" of discal cell concave, particularly in area of this cross vein. Vein between discal cell and lower basal cell very long, rather oblique, much longer than vein between fourth posterior cell and lower basal cell. Vein between second and third posterior cells long, S-shaped. First posterior cell at apex distinctly narrowed; third posterior cell at hind margin a little broader than first and second together.

Abdomen reddish, with more or less developed dark median stripe, yellow scaled and with very short black hairs; at base with very dense yellow hairs, forming two large tufts. Underside with yellow hairs and scales.

Length of body 12·5 mm., of wing 11–18 mm.

♂, Nyasaland, Ludzi Riv., 26.v.1928 (*R. C. Wood*); 1 ♂, 1 ♀, Tanganyika Terr., 1936 (*R. F. Johnstone*); 1 ♂, Nyasaland, Ruo Valley, 1000–2000 ft., 21–25.iv.1928 (*S. A. Neave*); 1 ♂, 1 ♀, Nyasaland, Lingadzi, near Domira Bay, 1700 ft., 1.iv.1915, 21.vii.1915 (*Dr. W. A. Lamborn*); 3 ♂, Nyasaland, Nth. Nyasa, 1916 (*Dr. N. M. Leys*); 1 ♂, N. E. Rhodesia, upper Luangwa Riv., Junctions of Luwumbu and Mwailesi Rivers, 27.viii.–3.viii.1910 (*S. A. Neave*); 1 ♂, Nyasaland, Mombera Distr., 4000 ft., 15–18.vi.1910 (*S. A. Neave*); 1 ♂, W. Africa, Togoland, Depia, 24.i.1917 (*J. J. Simpson*); 1 ♂, Brit. Somaliland, Burao (*R. L. Taylor*); 1 ♂, Centr. Africa, Lake Tanganyika, Kibwesa, 1.iii.1927 (*R. Bois*); 1 ♂, Nyasaland, 1909 (*J. B. Davey*); 3 ♂, Gold Coast, Tamale, xi.1916 (*J. J. Simpson*); 1 ♂, Kikuuni Riv., Ukamba, viii.1947 (*van Someren*); 1 ♂, Ukamba, Makueni, v.1947 (*van Someren*); 1 ♂, Nyasaland, Bua Riv., 1000 ft., 27.vi.1928 (*Dr. W. A. Lamborn*); 1 ♂, N.E. Rhodesia, Serenje (*Dr. F. H. Wilson*); 1 ♀, Belgian Congo, Katanga, Biano, 8–11.viii.1931 (*J. Ogilvie*); 1 ♀, Tanganyika, west shore of Lake Manyara, ii–v.1935 (*B. Cooper*); 1 ♀, Nyasaland, Valley of S. Rukuru R., 3000 ft., 20–27.vi.1910 (*S. A. Neave*).

Exoprosopa africana sp. n.

Belongs to group of *E. stupida, iris*, etc.

Male.—Ground colour of body black, only chin and sides of mouth cavity yellow. Anterior half of frons and middle part of face (on level of antennal bases) to apex of face with very dense, depressed, snow-white, brilliant scales, which form a kind of brilliant scutum. Sides of face with similar, but yellow-golden scales, borders of mouth cavity without scales, with only few black erect hairs. Proboscis a little protruding from oral cavity. Posterior half of frons and ocellar triangle deep black, shining, with erect black hairs. In anterior third of silvery-scaled portion a cross-row of erect black hairs present, which protrude through the silvery scutum. Indentation at hind margin of eyes also covered with depressed silvery scales. No cross-depression between bases of antennae. Vertex very narrow, less than one-eleventh of head-width. Third segment of antennae conical with a style as long as segment itself.

Thorax black; mesonotum with black scales, but anterior margin and sides of mesonotum with golden-yellowish hairs, the former with erect, the latter with more depressed hairs; in front of scutellum a large triangle of depressed yellow scales. Scutellum with black scales. Bristles before wings and on post-alar callus black. Sides of thorax with dense and long yellowish hairs in anterior half, posterior half nearly bare; metanotal tuft

yellow. Plumula above halteres whitish. Halteres yellow. Legs black, with black spicules and bristles. Wings hyaline, a little yellowish on whole surface, costal cell and base of wing a little darkened ; venation as on fig. 38 (*E. chionea*) of Bezzi, (1924, *Bombyliidae Ethiop. Reg.*). Shape of body also as in fig. 38, more rounded at apex.

Abdomen nearly hairless, covered with scales, but on sides of first tergite there are dense, erect, yellowish hairs. A common cross-band of yellow scales on posterior margin of first and on anterior margin of second tergite ; this parallel-sided band being very well marked. Second tergite, excluding anterior margin, covered with black scales. Anterior half of third tergite with a cross-band of yellow scales, but in outer anterior corners a few black and pure white scales. Almost the whole fourth tergite covered with yellow scales, only in outer anterior corners a few black scales ; remainder of tergites with sparse black and yellow scales. Underside of abdomen chiefly with golden-yellow scales and hairs.

Length of body 6·5 mm., of wing 6 mm.

Holotype, ♂, Nyasaland : Ruo, "on path", 17.vii.14 (*R. C. Wood*) (unique!). Type in the British Museum (Natural History).

Exoprosopa ancilla Bezzi.

I have before me a series from Belgian Congo : 9 ♂, 7 ♀, Elizabethville, 11–17.ix.1931 (*J. Ogilvie*), (*Mrs. L. Ogilvie*). They differ from the description given by Bezzi in small details.

Antennal style less than half as long as third segment ; underside of abdomen in some specimens regularly covered by whitish scales and hairs (but some have numerous black scales), etc.

These differences are not, I think, important.

One male, Belgian Congo : Sakania, ix.1931 (*Miss A. Mackie*) differs in having deep black hairs on the whole surface of the underside of the thorax (the mesopleurae also are black-haired !), and only the upper part of the metanotal tuft is yellowish-haired. I name this variety *E. ancilla* Bezzi var. **mackieae** var. n.

Type in the British Museum (Natural History).

Exoprosopa chrystallina Bezzi.

One female, Belgian Congo : Elizabethville, 11–17.viii.1931 (*J. Ogilvie*) seems to belong to this species. The head of the type is missing. I give a description of the head of the specimen before me.

Ground colour of head deep black, shining, but borders of mouth opening, antennae and lower part of frons yellow. Occiput covered with dense, depressed whitish iridescent scales, hairs quite absent. Indentation of hind margin of eyes well developed, broad division line of facets long. Vertex behind ocellar triangle narrowed, as broad as ocellar triangle, i.e. very narrow. Frons covered with extremely short, erect, black hairs and with iridescent scales, which are more developed at eye-margin above antennal base. First and second antennal segments equal, the third a little longer than the first two together, conical ; style not visible. Between the antennae a deep transverse furrow (a very good diagnostic character in palaearctic species !). Face in profile very prominent, conical, with some microscopic black hairs at apex, shining, with iridescent scales. Proboscis and palpi black. Mouth opening nearly equal to one-fifth of head width.

A KEY TO THE GENERA OF ONCOMERINI STÅL (HETEROPTERA: PENTATOMIDAE, TESSARATOMINAE), WITH THE DESCRIPTION OF A NEW GENUS AND SPECIES FROM AUSTRALIA AND NEW SYNONYMY.

By Dennis Leston, F.R.E.S.

Stål (1870) divided Tessaratominae Schilling, into five sections, which have subsequently been regarded as tribes. Later, further tribes were added—principally by Horvath (1900)—so that Kirkaldy (1909) listed no fewer than eleven. However, Eumenotini is clearly a tribe of Dinidorinae, whilst Delocephalini has been transferred to Phyllocephalinae with loss of tribal status (Schouteden, 1909). Recently, Natalicolini (= Aplosternini) has also been removed from Tessaratominae and given subfamily status within Pentatomidae (Leston, 1955).

Tribes of Tessaratominae.

In his original keys to the tribes of Tessaratominae Stål used venational characters of fore and hind wing, shape of the margins of the abdomen, structure of the metasternum and scutellum as well as the structure of the pronotum. Examination discloses that, apart from wing venation, the diagnostic criteria are of little more than generic weight; the wing venation, however, clearly splits the subfamily into two tribes. The aedeagus of *Oncomeris* Laporte has been examined and shown to be of the same general type as that of *Tessaratoma* Berthold, *Eusthenes* Laporte and *Sepina* Signoret (described in Leston, 1954*a*; Pruthi, 1925), i.e. there are no essential differences in the structure of the aedeagus between Tessaratomini and Oncomerini.

Key to Tribes of Tessaratominae.

1 Membrane with a series of three to five basal cells from which longitudinal transmembranal veins radiate; hind wing with R + M and Cu widely separate at their proximal two thirds **Tessaratomini** Schilling

2 Membrane without basal cells or with a single elongate and narrow, but feebly defined cell; hind wing with R + M and Cu parallel and contiguous at their proximal two thirds . . . . . **Oncomerini** Stål

The following groups, hitherto ranked as tribes, are reduced to subtribal status within Tessaratomini:

Prionogastraria Stål **stat. nov.**
Sepinaria Horvath **stat. nov.**
Eusthenaria Stål **stat. nov.**
Tessaratomaria Schilling **stat. nov.**
Platytataria Horvath **stat. nov.**

Notopomini, a monotypic group from S.E. Asia, is unknown to the writer. Pantochlorini, a monotypic group from central America is possibly related to

Edessini, Pentatominae, although it has characters in common with *Piezosternum* A. & S.; further work is in progress on the morphology of Edessini which should elucidate this problem.

Systematics of Oncomerini.

This tribe remains circumscribed as by its originator, Stål. It poses a zoogeographical problem for, whilst all the included genera but one are from the Oriental-Australasian regions, *Piezosternum* A. & S. occurs in Africa (very widespread), Madagascar and the Neotropical region. The aedeagus of *P. calidum* (F.) has been examined (Leston, 1954*b*) and shown to be quite unlike that of *Tessaratoma* Berthold in that it has a long, tubular and coiled vesica, very suggestive of Coreoid affinities, whilst in *Tessaratoma* the vesica is somewhat rigid and non-tubular (Leston, 1954*a*). Until the limits of the various Pentatomoid families have been re-defined, *Piezosternum* is retained within Oncomerini by virtue of its similar fore and hind wing venation, but is given group status.

Piezosternaria **subtrib. n.**

Tessaratominae, Oncomerini. Differs from Oncomeraria in having a long, flexible, coiled vesica. Metasternum produced forwards in a long, wide-based spine. Ethiopian and Neotropical.

Oncomeraria **subtrib. n.**

Tessaratominae, Oncomerini. Aedeagus similar in general structure to that of *Tessaratoma*; vesica rigid or semi-rigid, not elongate and coiled. Metasternum flat or swollen but never produced forwards. Oriental and Australasian.

All the genera included in the following key have been seen except *Cumare* Blöte, for which the author's description has been used (1945); *Tamolia* Horvath is unknown to the writer.

Key to Genera of Oncomerini.

1 Ethiopian and Neotropical; metasternum produced forwards as an elongate spine-like process . . . . **Piezosternum** Amyot & Serville
Australasian and Oriental; metasternum not produced forwards . . 2
2 Scutellum not or only slightly longer than broad (save in *Cumare*); third abdominal sternum without a median forwards-pointing spine-like process, but a median tubercle or swelling sometimes present . 3
Scutellum always much longer than broad; third abdominal sternum produced forwards in a spine-like process 7
3 Scutellum squarely truncate posteriorly; male genitalia surrounded apically by the seventh abdominal segment; paraclypeus greatly produced; flattened insects with a superficial resemblance to Natalicolinae . . . . . **Chinatessa** gen. n
Appearance otherwise 4
4 Postero-lateral pronotal angles spinously produced; third abdominal sternum without a median tubercle . . . . . **Neosalica** Distant
Postero-lateral pronotal angles not spinously produced; third abdominal sternum with a median tubercle 5
5 Antennae 4-segmented . . . . . **Stilida** Stål
Antennae 5-segmented 6

6 First antennal segment surpassing the apex of the head ; mesosternum without carinae . . . . . **Rhoecocoris** Bergroth
First antennal segment not surpassing the head ; mesosternum with anterior and posterior carinae . . . . . **Cumare** Blöte
7 Scutellum excavated at apex . . . . . **Agapophyta** Laporte
Scutellum not excavated at apex 8
8 Antennae 4-segmented 9
Antennae 5-segmented 10
9 Eye-ocelli distance equal to inter-ocelli distance ; ocelli clearly situated behind an imaginary line joining the eyes posteriorly ; lateral pronotal margins curved . . . . . **Oncomeris** Laporte
Eye-ocelli distance less than the inter-ocelli distance ; ocelli scarcely situated behind an imaginary line joining the eyes posteriorly ; lateral pronotal margins straight . . . . . **Plisthenes** Dallas
10 Apex of scutellum sharply pointed . . . . . **Lyramorpha** Westwood
Apex of scutellum rounded . . . . . **Erga** Walker

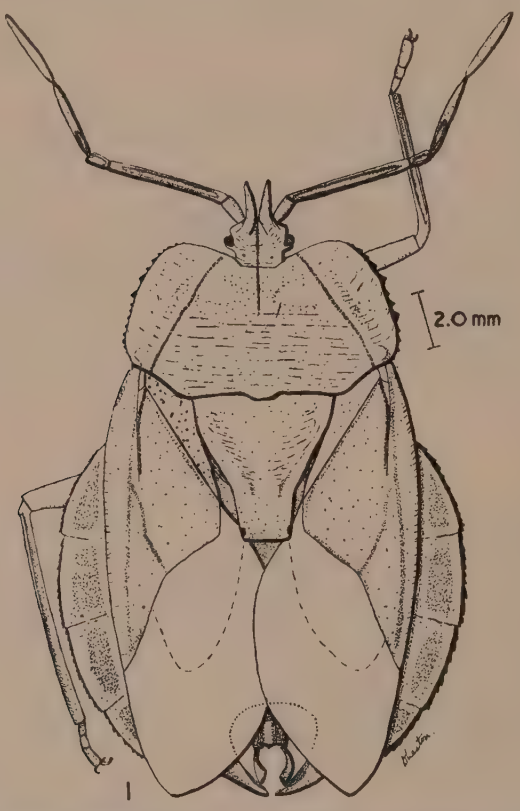


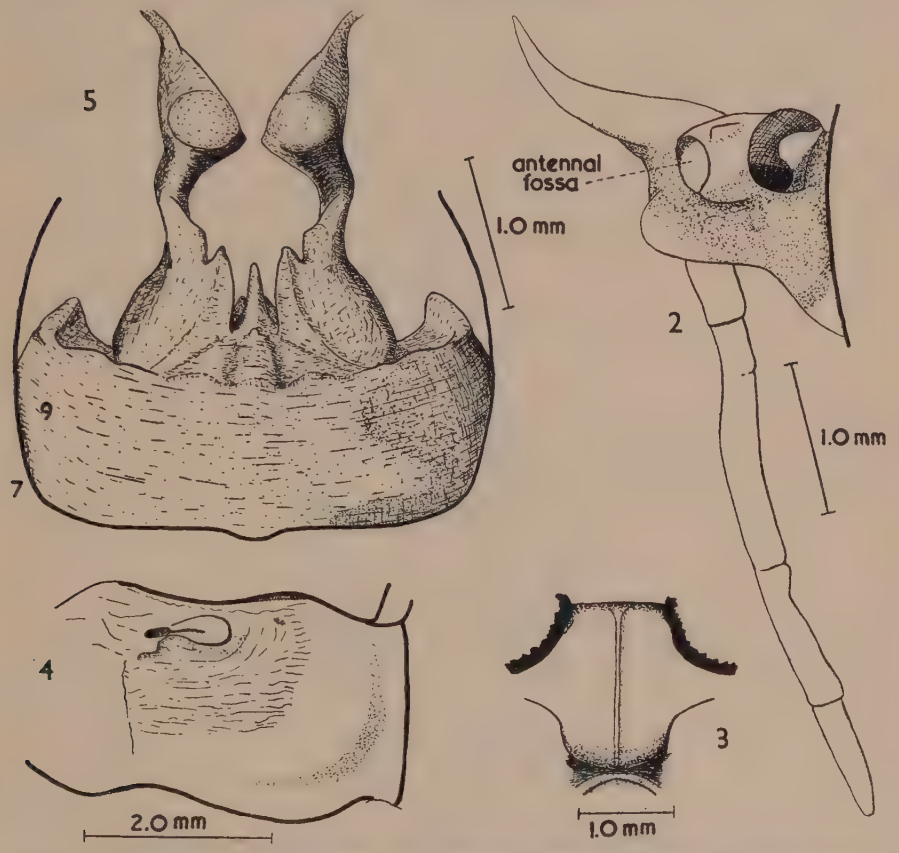
FIG. 1.—*Chinatessa natalicoloides* gen. et sp.n. Male type from Queensland, Australia (Venation of membrane omitted.)

Chinatessa gen. n. (Fig. 1–5.)

Very flat bugs ; abdomen circular ; head shorter than pronotum, pronotum slightly shorter on mid-line than scutellum.

Head very flat above, broader than long (excluding projections). Paraclypeus produced into long horn-like processes with upturned tips and reflexed lateral margins. Clypeus anteriorly almost completely hidden by the paraclypeal processes. Antenniferous tubercles visible from above, broad and oblique. Antennae 5-segmented, ratios 15 : 80 : 12 : 55 : 50 ; second and third segments fused ; second segment clearly and third and fourth segments obscurely canaliculate above. Eyes small. Inter-ocular : ocular-ocelli : inter-ocelli distances 3 : 1 : 1·5. Bucculae short, foliaceous anteriorly and there divergent. Rostrum reaching half-way across the mesosternum. Rostral ratios 20 : 35 : 15 : 13, second segment curved anteriorly.

Pronotum : maximum width to length on mid-line 17 : 8. Lateral margins flat and foliaceously expanded. Antero-lateral and postero-lateral angles rounded ; postero-internal angles rounded and obtuse. Lateral margins rounded, edges sharp and serrate. Scutellum as long as its basal width ; lateral margins rounded anteriorly, straight and convergent posteriorly ; apex truncate. Tarsi 3-segmented.



Figs. 2–5.—*Chinatessa natalicoloides*. (2) Head and rostrum, lateral. (3) Metasternum. (4) Left stink-gland external orifice and evaporatorium. (5) Male ninth abdominal segment (pygophore) from below.

Hemelytra as figured ; membrane with numerous longitudinal veinlets, cells and cross-veins indistinct and largely wanting. Hind wing short, but venation complete.

Abdomen above circular, connexival segments rigidly fused, margins finely serrate.

Prosternum slightly carinate, mesosternum flat medially, metasternum swollen medially

and with a median carina. Stink-gland opening large, leading to a short, apically raised, auriculate process. Evaporatorium well defined, with numerous low rugosities. Venter very flat; second abdominal segment visible medially only as a narrow, curved, raised strip. Second abdominal spiracles visible. Paired trichobothria present on segments 3–7.

Male genital segment short and cylindrical, deeply embedded in the abdomen and surrounded ventrally by a ventral hood-like deflection of the seventh segment posteriorly. Genital segment ventrally produced into a median process with two long lateral projections. Claspers not seen (either reduced or absent).

Type species: *Chinatessa natalicoloides* sp. n.

Distribution: QUEENSLAND.

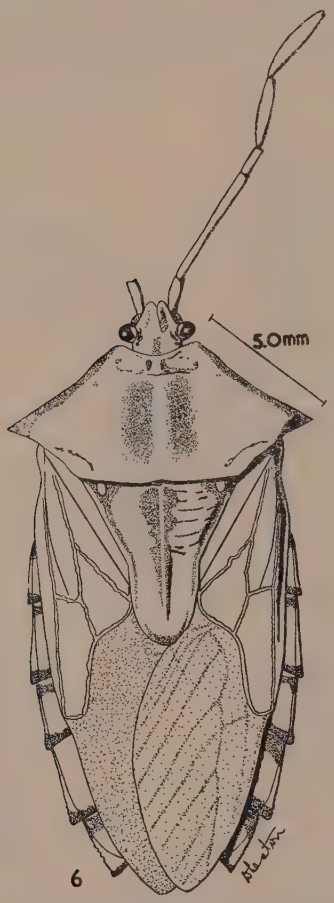


FIG. 6.—*Neosalica pedestris* (Breddin). Male, Sadon, N.E. Burma, 1200 metres (Malaise).

Chinatessa natalicoloides sp.n.

Male.—Largely yellow with pink and green tints admixed (faded museum specimen of great age). Head with median line brown and inner margins of paraclypeal processes pale brown. Pronotum with a median brown line anteriorly and an oblique brown line from behind the eyes to behind and within the postero-lateral angles. Lateral pronotal line

continued for a short distance on the corium. Corium pinkish; connexival segments centrally pink. Lateral serrate margins of pronotum and abdomen black. Venter yellow with ventral connexivum pink and tibiae and tarsi red.

Head rugose, finely punctate on the clypeus. Antennae finely pubescent. Pronotum rugose except for two low and indistinct anterior calli; lateral areas densely but minutely punctate, elsewhere less so. Scutellum transversely rugose, punctate, apex greenish with two dark ante-apical marginal spots.

Abdomen produced in two inwardly curving processes which surround the genital segment, the processes triangular in cross-section.

Length 22·0 mm.; maximum pronotal width 10·0 mm.; maximum abdominal width 15 mm.

Female unknown.

Type male, " N.E. Austral.", in British Museum (Nat. Hist.). Presented by Perth Museum, Scotland; B.M. No. 1953–629. Ex Coll. Buchanan-White.

Chinatessa is named in honour of Dr. W. E. China who, upon receiving it amongst unnamed material from the Perth Museum, recognised it as an undescribed genus.

Neosalica Distant, 1882.
Ent. mon. Mag. **19** : 168. Type : *N. forbesi.*
Mesolea Breddin, 1902 **syn. nov.**
Wien. ent. Ztg. **21** : 99. Type : *M. pedestris.*

1. *forbesi* Distant, 1882 (*Neosalica*).
Ent. mon. Mag. **19** : 157. Sumatra.

2. *pedestris* Breddin, 1902 (*Mesolea*).
Wien. ent. Ztg. **21** : 100.
nigrovittata Distant, 1921 (*Neosalica*) **syn. nov.**
Entomologist **54** : 164. Tonkin, Sikkim, N. Burma.

Neosalica (fig. 6) is the sole genus of Oncomerini reaching to the Asiatic mainland; it has not previously been figured.

Acknowledgments.

Dr. W. E. China and The Trustees, British Museum (Nat. Hist.) are thanked for the facilities provided and for permission to describe the unique *Chinatessa.* Dr. R. Malaise and the Naturhistoriska Riksmuseum are thanked for supplying examples of *Neosalica.*

Summary.

1. Tessaratominae is restricted to include two tribes, Oncomerini and Tessaratomini.

2. Tessaratomini includes subtribes Tessaratomaria, Prionogastraria, Sepinaria, Eusthenaria and Platytataria.

3. Oncomerini includes two subtribes, Oncomeraria and Piezosternaria.

4. Piezosternaria is retained *pro. tem.* within Oncomerini although its aedeagus is different in general structure.

5. A key to all known genera (except *Tamolia*) of Oncomerini is provided.

6. *Chinatessa natalicoloides* gen. et sp. n. is described from Queensland.

7. *Neosalica* and *Mesolea* are synonymised and illustrated.

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Horvath, G., 1900, Analecta ad cognitionem Tessaratominorum. *Termeszetr. Füz.* **23** : 339–374.

Kirkaldy, G. W., 1909, *Catalogue of the Hemiptera* (*Heteroptera*), **1**, *Cimicidae*. Berlin.

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——, 1954*b*, Notes on the Ethiopian Pentatomoidea (Hemiptera), XVII. Tessaratominae, Dinidorinae and Phyllocephalinae of Angola. *Publ. cult. Cia. Diam. Angola* **24** : 11–12.

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Stål, C., 1870, Enumeratio Hemipterorum 1. *K. svenska. VetenskAkad. Handl.* **9** (1) : 1–232.

THREE SUBSPECIES OF *CTENOPHTHALMUS CONGENER* ROTHSCHILD FROM THE FAR EAST. (SIPHONAPTERA: HYSTRICHOPSYLLIDAE).

By F. G. A. M. Smit, F.R.E.S.

(*British Museum* (*Natural History*); *The Zoological Museum, Tring, Herts.*)

The specimens of the three subspecies dealt with in this paper were collected by United States Army personnel in 1951 and 1952. I am deeply indebted to Dr. E. W. Jameson Jr., for permitting me to work out the material of the subspecies of *Ctenophthalmus congener* from Korea and Japan. Through his own collecting activities and the publication of *The Fleas of Japan and Korea* (1953, *FEC Pamphlet* 8–2), Dr. Jameson has greatly stimulated the study of the fleas from the Far East, and added much to our knowledge of the fleas of that part of the world.

Lt.-Col. R. Traub, Walter Reed Army Medical Center, Washington, D.C., and Dr. C. F. W. Muesebeck, Bureau of Entomology and Plant Quarantine, Washington, D.C., very kindly lent additional specimens for study and comparison. Dr. Jameson has generously presented the holotypes, allotypes and several paratypes of the two new subspecies to the British Museum (Natural History).

Ctenophthalmus congener congeneroides Wagner, 1930. Figs. 1–2.

Ctenophthalmus congeneroides: Wagner, 1930, *Annu. Mus. zool. Acad. Sci. U.R.S.S.* (1929) **30**: 537–538. (1 ♂ 1 ♀, on the isle opposite the Malyscheva Protoka on the River Ussuri,[1] from a mouse).

Ctenophthalmus congeneroides Wagn. Wagner, 1930, *Mag. Parasit., Leningr.* **1**: 162.

Ctenophthalmus congeneroides Wagn. Wagner, 1931, *Konowia* **10**: 98.

Euctenophthalmus congeneroides Wagn. Wagner, 1940, *Z. Parasitenk.* **11**: 599, 600.

(?) '*Euctenophthalmus congener*' Kucheruk, 1949, *Studies local exper. descr. parasit.* **6**: 7, 12.

Euctenophthalmus congeneroides Wagner. Peus, 1949, *Z. Parasitenk.* **14**: 97.

'*Ctenophthalmus congener* Rothschild.' Jameson, 1953, *FEC Pamphlet* 8–2, *U.S. Army Forces, Far East*: 13, figs. 25, 26.

Ctenophthalmus congener congeneroides Wagner. Smit, 1953, *Entomologist* **86**: 22.

Ctenophthalmus 'bogatschevi Wagner et Argyropulo' Nagahana, 1954. *Jap. J. sanit. Zool.* **4**: 272, figs. 13–15.

Material examined.—All specimens are from Korea:

Seoul (in its vicinity), 1 ♂, viii.51, *Apodemus agrarius*; 1 ♀, 20.ix.51 and 1 ♀, ix.51. Chongyang-ni, 2 ♂, 17.vii.52, *A. agrarius*. Cent. Natl. Forest, 1 ♂ 1 ♀, 26.vii.52, *A. agrarius*. Yangu, 1 ♂, 12.viii.51, *A. agrarius*. Munhje-ri, 1 ♂, 27.viii.51, *A. agrarius*. Without locality: 1 ♀, 2.iii.52, *A. agrarius*; 1 ♀, 18.iii.52, *Crocidura sodyi*; 1 ♂, 27.iii.52, *A. agrarius*; 1 ♂, 21.iv.52, *A. agrarius*; 1 ♂ 1 ♀, 12.vii.52, *A. agrarius*; 1 ♂ 2 ♀, 10.iii.52,

[1] I have been unable to trace the Malyscheva Protoka. The Russian word Protok means "watercourse" or "canal connecting two river basins." The Ussuri forms for most of its length the frontier between Manchuria and the Maritime Territory of the U.S.S.R.; the type-locality is probably on the Russian side of the river. The collector was W. Soldatov.

FIGS. 1–2.—*Ctenophthalmus congener congeneroides.* (1) Clasper and sternum IX, male (Korea); (2) Sternum VII and spermatheca, female (*a*) and outline of sternum VII of 5 females (*b–f*) to show variation (all from Korea).

A. agrarius ; 1 ♂ 4 ♀, 14.iii.52, *A. agrarius* ; 1 ♂, 18.iii.52, *A. agrarius* ; 1 ♂, 23.iii.52, *A. agrarius*; 1 ♀, 23.iii.52, *Apodemus speciosus* ; 1 ♂ 1 ♀, 2.vi.52, *Crocidura* sp. ; 1 ♂, 16.iv.52, *A. agrarius* ; 1 ♂ 1 ♀, 18.iv.52, *Rattus rattus* ; 1 ♀, no date, *A. agrarius*.

Remarks.—Wagner published no figures of *C. congeneroides* in his original description and no specimens from the type-locality or near have ever been figured (and very likely also not collected, apart from the type specimens). The Korean specimens, listed above, agree with Wagner's description, which reads : " der mittlere allerlängste Sporn am Hinterrande der Hinterschienen ist kürzer als die Hälfte der Schienenlänge (beim ♂ war dies Verhältnis = 18 : 8, beim ♀ = 21 : 9)." In the Korean specimens this seta is about half the length of the tibia ; this is a rather unsatisfactory character, since the length of setae is subject to a fair amount of variation. " Der obere proximale Winkel des beweglichen Fingers der Genitalschere des Männchens ragt mehr nach vorne heraus und infolgedessen laufen der Vorder- und der Hinterrand des Fingers schroff nach unten zusammen (d.h. in der Richtung der Stelle, wo der Finger befestigt erscheint). Der distale obere Winkel des beweglichen Fingers bildet eine deutliche Kralle." This description of the movable process of the clasper fits the Korean males (see fig. 1), but whether other details are in agreement cannot be ascertained in the absence of a figure of *congeneroides* from the Ussuri area. " Der obere Apikalwinkel des horizontalen Zweiges des 9. Sternits beim Männchen ragt weiter hinaus als der untere." Similar in the Korean specimens (fig. 1). " Beim ♀ ist die Seitenausbuchtung am Apikalrande des 7. Abdominalsternits kurz und scharf ; der unterhalb desselben sich befindliche untere Seitenlappen hat die Form einer kleinen Zunge." The Korean females agree with this description but, as could be expected, there is a good deal of variation in the outline of the posterior margin of sternum VII (fig. 2 *a–f*).

In his description Wagner states that *Ctenophthalmus congeneroides* is very closely related to *Ctenophthalmus secundus* Wagner, apparently replacing the latter in the Far East. Later (1940 : 600) he suggested that *congener*, *secundus* and *congeneroides* were probably races (subspecies) of one and the same species. I fully concur with this suggestion and have already placed *congeneroides* as a subspecies of *congener* (Smit 1953 : 22).

My determination of the Korean subspecies as *Ctenophthalmus congener congeneroides* Wagner should be regarded as more or less provisional, for the localities in Korea from where I have seen material are roughly at least 500 miles south of the type-locality. On geographical grounds it seems fairly improbable that the Korean specimens should be different from the Ussuri subspecies, but not until specimens from the Ussuri area have been collected can absolute certainty be gained about the status of the Korean specimens. For this reason no neotype of *C. c. congeneroides* Wagner should be designated from Korean specimens ; the holotype has most likely been lost.[2]

[2]After this paper had gone to press, I received through the kind offices of Lt.-Col. R. Traub a paper by Ioff, Dubinin and Zheludkova (1950, *Mater. K. Poznan, Faun. Flor. S.S.S.R., Ectoparasites N.S.*, 2, *Zool. Sect.* No. 15 **(30)** : 30–43) in which *C. c. congeneroides* is recorded (p. 35) from Transbaikal, the Amur area, many parts of the Maritime Territory, Manchuria and Korea. This confirms my assumption that the Korean specimens belong to the subspecies *C. c. congeneroides*, but does not affect the question of a neotype, since this should come from a locality as near as possible to that of the lost holotype.

Figs. 3–4.—*Ctenophthalmus congener honshuensis.* (3*a*) Clasper and sternum IX, male (holotype); (3*b*) processes of clasper (Niigata). (4) Sternum VII and spermatheca, female (*a*, from Hanase) and outline of sternum VII of 2 females (*b* from Hanase, *c* from Yunoyama) to show variation.

Ctenophthalmus congener honshuensis subsp. n. Figs. 3–4.

The new subspecies is closely related to *C. congener congeneroides* Wagner, from which it differs in the male by the narrower apical portion of the movable process of the clasper ; the female is indistinguishable from that of *C. c. congeneroides*.

Male (fig. 3*a*, *b*).—Fixed process of clasper with three long setae and several shorter ones along the margin near and at its dorsal portion ; the lower process narrow. Movable process of clasper like that of *C. c. congeneroides*, but apically narrower and the dorso-anterior part much more strongly rounded and with six sensory setae instead of seven as in *C. c. congeneroides*. Distal arm of sternum IX similar to that of *C. c. congeneroides*, but narrower. *Female* (fig. 4*a–c*) : Not separable from that of *C. c. congeneroides* or from most of the other subspecies. Length ♂ and ♀ : 2 mm.

The close relationship between *C. c. honshuensis* and *C. c. congeneroides* suggests that the separation of Honshu from Korea is of a more recent date than the separation of Honshu from Hokkaido, since the subspecies occurring in the latter island is quite different from both first mentioned subspecies.

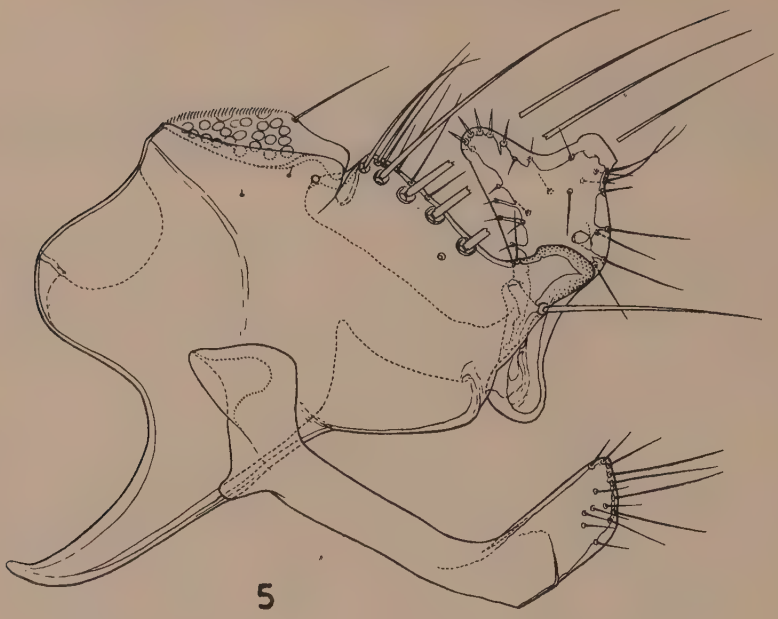
Type material.—Male holotype, female allotype and one female paratype, Japan : Hanase, Kyoto Pref., Honshu, 11.vi.52, *Clethrionomys rufocanus smithi* (allotype and paratype) and *Apodemus speciosus* (holotype) (*E. W. Jameson*) ; 1 ♀ paratype, Yunoyama, Mie Pref., Honshu, 13.iv.52, *Apodemus speciosus* (*E. W. Jameson*) (this paratype in the Smithsonian Institution, Washington, D.C.) ; 1 ♂ paratype, Niigata, Honshu, 16.x.45, *Microtus montebelli* (*C. B. Philip*) ; 1 ♀ paratype, Yamagata, Honshu, 28.x.45, *Mus musculus* (*C. B. Philip*) (the last two paratypes are the property of Dr. W. L. Jellison, U.S. Public Health Service, Hamilton, Montana).

Ctenophthalmus congener hokkaidensis subsp. n. Figs. 5–6.

'*Euctenophthalmus congener* (Rothschild, 1907).' Hasegawa, 1947, *Matsumushi* **2** : 42–45 (1 ♂ 2 ♀, Sapporo, Hokkaido, Japan, *ex Rattus norvegicus*).

The male of this new subspecies is easily distinguishable from males of the other known subspecies of *Ctenophthalmus congener* by the concavity of the dorsal margin and the large and heavily sclerotised dorso-posterior angle of the movable process of the clasper ; it resembles in this respect *C. savii* (from Italy), but in the latter the concavity of the dorsal margin is much deeper. The female seems to be recognisable by the weak development of the lobe of the margin of sternum VII below the sinus, but this character will prove to be rather variable.

Male (fig. 5).—Fixed process of clasper with four long setae and several smaller ones along the margin near and at its dorsal part ; the lower process distinctly projecting and fairly broad. Movable process of clasper with its lower half narrow and fairly abruptly widening in its middle portion ; its dorso-anterior angle strongly produced, with only five sensory setae at the apex ; the dorso-posterior angle markedly obtuse ; chaetotaxy of the movable process as in the other subspecies of *C. congener*. Distal arm of sternum IX short, with a very oblique apical margin. *Female* (fig. 6*a–c*) : Sternum VII with a large and truncate dorsal lateral lobe, below which a shallow sinus and the lobe below this sinus not very distinct in two specimens (fig. 6*a*, *c*), but more developed in a third (fig. 6*b*). Sternum



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6

FIGS. 5–6.—*Ctenophthalmus congener hokkaidensis.* (5) Clasper and sternum IX, male (holotype). (6) Sternum VII and spermatheca, female (*a* from Sapporo) and outline of sternum VII of 2 females (*b* from Sapporo, *c* from Jozankei) to show variation.

VII resembles that of *C. c. secundus* Wagner and, as the outline may be expected to vary considerably, it will not always be easy to distinguish between the females of several subspecies, except on geographical grounds.

Type material.—Male holotype, female allotype and one female paratype, JAPAN: Sapporo, Hokkaido, 20. iv.52, *Clethrionomys rufocanus*; 1 ♂ paratype, Sapporo, Hokkaido, iv.52, from nest of *Clethrionomys rufocanus* (this paratype in the Smithsonian Institution, Washington, D.C.); 1 ♂ 1 ♀ paratype, Jozankei, Ishikari Pref., Hokkaido, 7.viii (♀) and 8.viii.52 (♂), *Apodemus sylvaticus argenteus*, (*E. W. Jameson* and *P. W. Oman*) (these two paratypes also in the Smithsonian Institution).

ETHIOPIAN CULICIDAE: A DESCRIPTION OF THE LARVA AND PUPA OF *AËDES* (*STEGOMYIA*) *WOODI* EDWARDS.

By Mrs. E. C. C. van Someren and J. O. Harper.

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Aëdes (*Stegomyia*) *woodi* Edwards.

Over the last four years many collections of mosquitoes bred from various larval breeding sites have failed to produce *Aëdes woodi*, so that the breeding place of this mosquito is still not known. The early stages described below were obtained from eggs laid by gravid females and reared to adult stage.

The adults were collected off human bait in the undergrowth of a small patch of wood at Ganda, a village about six miles inland from Malindi on the Kenya coast. The females were allowed to feed on the bait before capture and to this we attribute our success in at last obtaining eggs, numerous previous attempts to induce adults to feed in captivity having failed. When the mosquitoes were engorged they were caught in test tubes which were immediately placed in a Barraud box, as it was found the females did not survive long in tubes unless kept in a fairly humid atmosphere. As soon as possible they were taken to the field laboratory and there they were isolated in 3 × 1 in. glass tubes previously prepared according to the method described by Gillett *et al.* (1950) for obtaining eggs from isolated females. When the eggs appeared they were taken from the tubes and kept damp for 24 hours, dried for 24 hours, and at 48 hours they were placed in basins or coconut shells and flooded with water to which a little hay infusion was added.

Eggs laid by female No. 85 on 18.vi.54 were placed in water on 21.vi.54 and the adults emerged 14 days later on 5.vii.54. The larvae behaved much as other *Stegomyia*, spending a great deal of time browsing on the bottom of the containers.

Larva.

The larva is very like that of *A.* (*S.*) *simpsoni* Theobald, but even more closely resembles *A.* (*S.*) *subargenteus* Edwards. It is easily separated from *A. simpsoni* and the very similar *A.* (*S.*) *strelitziae* Muspratt on the character of the comb spines, which do not appear trifid, having a number of coarse denticles. From *A. subargenteus* it can be separated on the character of the pecten teeth, which usually have many small dorsal and ventral teeth as well as two or three larger and deeply indentated teeth at the tip.

Colour: The colour in life grey with head and siphon dark brown.

Head: Antennae short, straight, cylindrical and smooth, dark and with the tuft single and simple and usually placed at about seven-elevenths, but on one side of one specimen it was at three-quarters. Setae A, B and C usually single, but A occasionally bifid; *d* split into two beyond the base and *e* and *f* usually 2-branched, but *e* may be single. Mentum with 11 teeth (all much the same size) on either side of the central tooth and basal teeth not much wider spaced.

Thorax: Spines at bases of meso- and meta-thoracic pleural tufts very small and straight. *Abdomen:* 6–14 comb spines (usually over 10) present, which show considerable variation, some being long and narrow and others shorter and broad, but all with many coarse denticles as figured (fig. 1, *a*). Siphon covered with rows of minute spicules and short, with an index of about 3 in uncrushed larvae, and dorsal setae at apex spine-like. Subventral tuft about the length of the diameter of the siphon at point of attachment, minutely and finely plumose under high powers of the microscope, placed at about two-

Fig. 1.—*Aëdes woodi* Edwards. (*a*) Larval comb spines; (*b*) pecten spines.

thirds and may be single but is more often bifid and sometimes with 3 branches. Pecten reaching as far as subventral tuft and is a (sometimes very uneven) row of from 8–17 (usually about 13) spines, with the last spine sometimes wider spaced and occasionally with 1 or 2 teeth beyond the subventral tuft. Spines not much darker than siphon and under low powers appear bluntly triangular but are rather variable (fig. 1, *b*); usually one or more spines in any particular pecten have about 3 fairly coarse denticles at the tip with nearly the whole of the ventral surface minutely denticulate, and sometimes also the dorsal surface, but there may be only a few denticles on the dorsal side. Saddle completely covered with rows of spicules (rather coarser than those on siphon) and saddle hair finely and minutely plumose, single or bifid and about the length of the saddle. Upper caudal seta with 3–5 branches and the lower usually 2-branched but occasionally with 3 or 4 branches. Ventral brush consists of 4 pairs of bifid setae but sometimes one or more

of the setae may be 3-branched and the short setae are occasionally single. " Gills " sausage-shaped, subequal and about 3 times length of saddle.

Pupa.

The chaetotaxy of the pupa is very like that of *A. simpsoni* and *A. strelitziae*, but may be separated from the former by having hair 8 on the eighth tergite over two-thirds the length of the paddles. This character will not separate

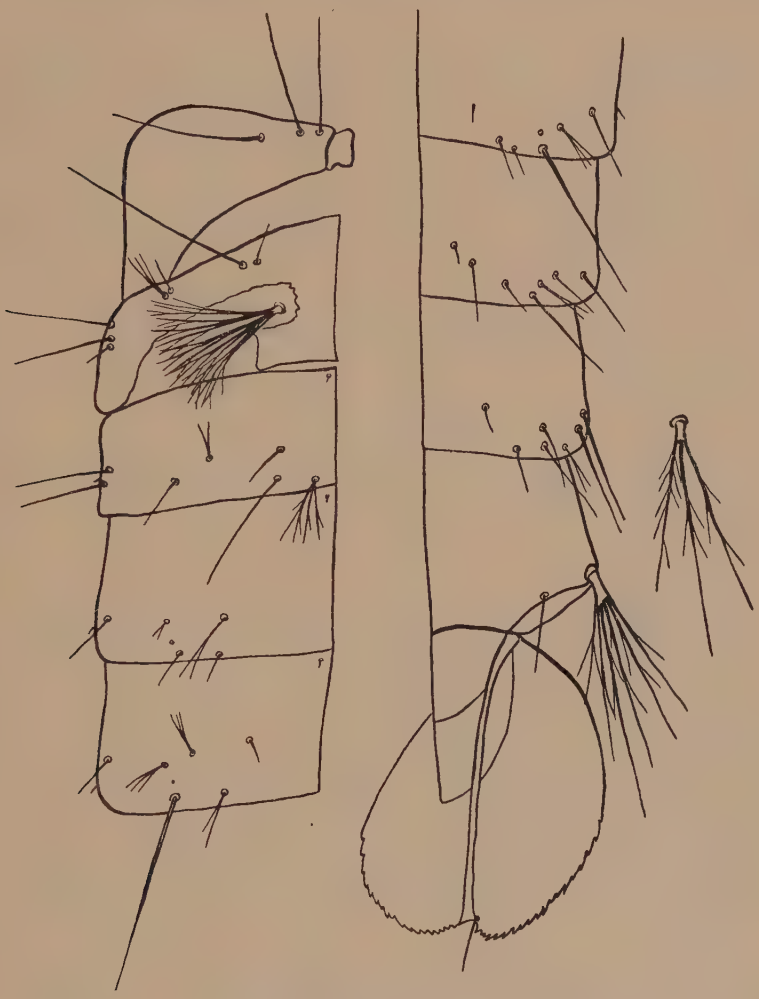

FIG. 2.—*Aëdes woodi* Edwards. Pupa.

the pupa of *A. woodi* from that of *A. strelitziae*, which also has this hair long, but a possible distinguishing character is that hair 5 on the fourth tergite is at least as long as the width of the segment. Muspratt (1950) describes this hair (B) on the fourth segment of *A. strelitziae* pupa as being about half the width of the segment.

Thorax: Trumpets short and dark and with an oblique opening. Hairs 1–9 short, fine and single or with up to 3 branches, with hair 6 slightly longer and stouter than the others and minutely plumose. Hairs 10–12 subequal and single or bifid. *Abdomen:* as figured (fig. 2). In addition, on tergite I hair 5 may have as many as 6 branches and hair 10 is sometimes trifid. Tergite II can have hair 10 bifid and hair 2 with 3–6 branches and on segments III–VII hairs 2 and 4 are single or with 2–3 branches, 6 has up to 4 branches and 7 and 8 can be sparsely and finely plumose. Hair 5 on eighth tergite sometimes bifid.

The nomenclature used to describe the pupa is that of Knight and Chamberlain (1948).

Described from the paedotype, 18 larval and 13 pupal pelts and 5 whole larvae bred from eggs laid by a female caught at Ganda, near Malindi, Kenya coast. The paedotypes will be sent to the British Museum (Nat. Hist.), London.

Hopkins' (1952) key to the known larvae of the genus *Aëdes* can be amended as follows to include this larva:

At section 17, at the end of the first line, for "18" read "17a" and add a new section as follows:—

17a Typical pecten teeth with numerous small ventral (and often also dorsal) denticles and 2 or 3 large median apical denticles . . . **woodi**
Typical pecten teeth with few small ventral and dorsal denticles not reaching to tip 18

Acknowledgments.

We wish to thank the African Entomological Assistants, George Oketch and Hammerton Willie, who contributed greatly to the success of our efforts to obtain the early stages of this mosquito.

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THE MOSQUITOES OF LIBERIA (DIPTERA : CULICIDAE).

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This paper is the first of a series based on material collected by the author between April, 1953, and May, 1954, in the Liberian Hinterland and later studied at the British Museum (Natural History).

Three Ethiopian species of the subgenus *Culiciomyia* Theobald have been described since the publication of Edwards' work (1941). They are *milloti* Doucet, 1949, *mongiro* van Someren, 1951, and *furlongi* van Someren, 1954. The adult of *milloti* and the early stages of *mongiro* are unknown. Two new species of the subgenus and a previously unknown Anopheline egg are described below.

1. **Culex (Culiciomyia) harleyi** sp. n.

The present species, while fitting the diagnostic criteria of the subgenus *Culiciomyia*, is aberrant in the larval and adult stages. The larva resembles that of *Culex moucheti* Evans in lacking a ventral brush, but it is readily differentiated by the larger and more numerous tufts on the siphon. The male genitalia differ from those of all other known members of the subgenus, especially in the shape and ornamentation of the lateral plates of the phallosome.

Female.—Head : Dark, clothed above with flat grey and narrower brown semi-decumbent scales and dark brown erect scales ; a narrow but sharply contrasted rim of flat white scales adjacent to the eyes ; palpi and proboscis dark brown to black. *Thorax :* Dark brown with a single or double row of acrostichal bristles ; integument covered with very small lighter brown hair-like scales except for the prescutellar bare area. Pleurae pale green and shining, the upper part somewhat darker, with a long patch of flat white scales on the posterior edge of the sternopleura ; mesepimeron devoid of scales ; one lower mesepimeral bristle (and occasionally a short hair adjacent to it). *Abdomen :* Dark scales above, the scales giving a dark emerald-green sheen when seen in a strong light ; tergites 3–7 with small apical lateral patches of white scales ; sternites 3–7 with pale scales on the apical half. *Legs :* Mainly dark brown, hind femur white dorsally on the proximal one-eighth, the white scales extending ventrally to cover the ventral surface almost to the apex ; dark dorsal stripe on the distal seven-eighths broadening outwards ; no pale spots at the joints. *Wings :* Dark scaled ; outstanding scales on vein 2 very long and narrow. *Pharynx :* About 10 teeth each side of 5 smaller central teeth, as in Edwards' illustration of *Culex cinereus* Theobald ; post-pharyngeal bar with many rows of tiny spicules.

Male.—Head : Flat head scales with a wider postocular rim than in the female ; palps (fig. 1*a*) with specialised scales on the distal third of the shafts ; length of penultimate and last segment in ratio 1 : 1·5. *Thorax :* Acrostichal bristles more numerous ; pleural scales fewer ; lower mesepimeral bristle single. *Terminalia* (fig. 1*b*, *c*, *d*) : Style curved, with a delicate membranous flange ; a spiny crest reaching the tip and a single small hair below, just proximal to the tip. *Coxite :* Lobe divided with two leaflets, the distal scimitar-shaped and the proximal very narrow ; about 10 short single hairs forming a patch in the centre of the lobe ; rods *a*, *b* and *c* dark, *a* and *b* hook-tipped, *c* straighter ; hair *h* longer than the main leaflet. *Paraprocts :* Broad with a small basal arm, the outer-

most spines of the crest longer and stouter than the others. *Phallosome:* Lateral plate very broad with a recurved basal tooth, the ventral surface broad, recurved and shagreened; lobes of ninth tergite flattened, each with about 12 bristles. *Wing length:* About 3·3 mm.

Early stages.—The type series was reared from a single batch of larvae, but liaison pelts were not separated. The larva is remarkable in the complete absence of a ventral brush. It otherwise has the tail structure commonly seen in *Culiciomyia.*

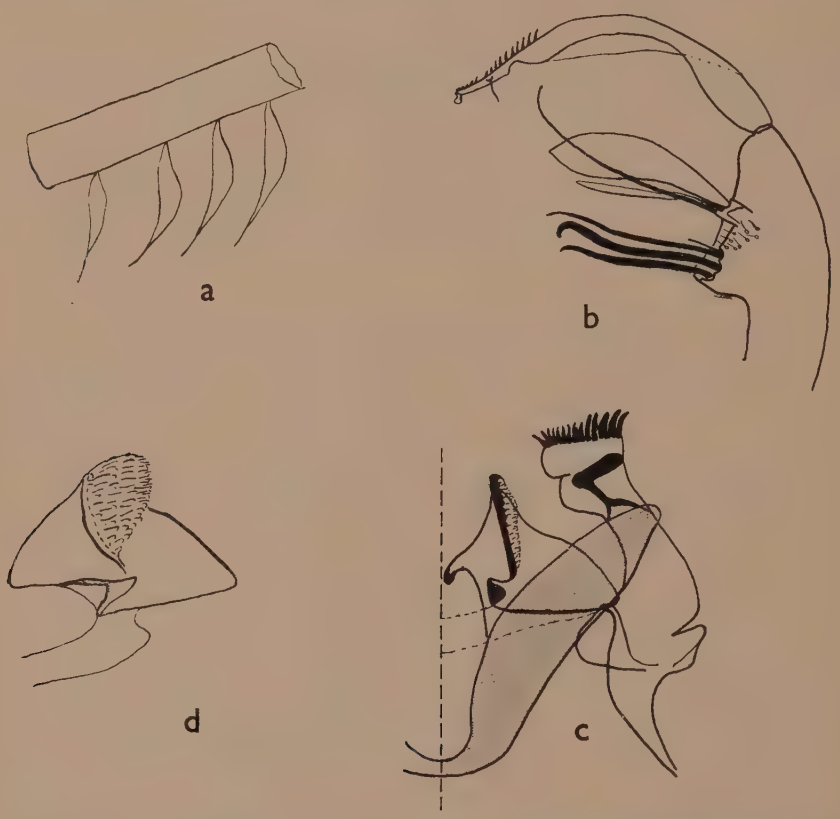

Fig. 1.—*Culex* (*Culiciomyia*) *harleyi* sp. n. Male. (*a*) Distal specialised scales of palpi; (*b*) coxite; (*c*) phallosome and paraproct; (*d*) lateral plate of phallosome rotated to show ventral surface.

Larva.—Length: About 8 mm. *Colour:* Body whitish, head and siphon pale brown. *Head* (fig. 2*a*): A little broader than long; antennae about one-quarter as long as the head, smooth, basal half cylindrical, distal half with a slight taper; tuft just beyond a half with 2 very slender simple branches about three-quarters the length of the antennae; subapical and apical setae all placed at tip of antennae and approximately equal in length, apical papillae rectangular, twice as long as wide, a little shorter than the setae; clypeal spines slender and bristle-like; setae A, B and C all short; A single and simple, about half as long as antenna; B and C minute and bifid; all placed well forward on the clypeus anterior and medial to the insertion of the antennae; *d* not identified; *e* small, bifid; mentum (fig. 2*b*) rather long and narrow with about 7–9 teeth on each side of a central tooth,

the basal teeth longer than the central ones. *Thorax :* Dorsal hairs of the prothorax similar to those of *Culex moucheti* Evans, numerous and long, delicately plumose, the longest nearly reaching the front margin of the head ; the innermost of these hairs each side arise in 3 tufts from 2 conspicuous chitinous plates which may be fused, each tuft with 3, 2–3 and 3 branches respectively from medial to lateral ; lateral to these is a row of 3 small paler chitinous plates the bases of which are fused ; from these arise tufts of hairs which are 2, 1–2 and 3 branched ; the pleural setae of the prothorax arise from a conspicuous chitinous plate placed well forward and supporting one long simple and one shorter trifid hair ; mesothorax with 2 fused chitinous plates lying laterally and fused to a third plate which lies ventro-laterally ; the lateral plates support one long trifid hair each and the

Fig. 2.—*Culex* (*Culiciomyia*) *harleyi* sp. n. Early stages. (*a*)–(*c*) Larva : (*a*) head ; (*b*) mentum ; (*c*) terminal segments ; (*d*) pupal trumpet, dorsal and lateral views.

ventro-lateral plate a pair of long 4-branched setae ; metathoracic dorsal and lateral hairs arise from 2 fused conical plates on each side ; the smaller dorsal plate supports one long trifid hair, the lateral 1 long trifid and bifid and 1 short slender single hair ; the base of the lateral conical plates is extended to form 3 or 4 short tooth-like projections. *Abdomen* (fig. 2*c*) : First and second segments with 2 tufts of long lateral setae arising from a small chitinous plate, a 3-branched tuft pointed antero-ventrally and a 4-branched tuft pointing antero-dorsally ; segments 3–5 with a long lateral tuft of 3 branches and a dorsal tuft of 4 short stout setae ; segments 3 and 4 have 12–16 transverse rows of minute spicules on the ventral surface ; a single ventral hair on segments 3–5 which is sometimes reduced in 6 and 7 to a small slender hair trifid from half its length ; on segment 7 the lateral tuft is reduced to a single tiny bifid hair while the dorsal tuft remains, but smaller and sometimes with only 2 or 3 branches ; segment 8 with tuft B large with 5 or 6 stout subplumose branches, a strong single or double ventro-lateral hair, the other tufts present, but very short and

trifid. Comb with 6–8 strong spines fringed with denticles on the basal half of each side, often set asymmetrically; siphon small, index about 2 in uncrushed specimens; pecten present, reaching less than halfway along the siphon from the base and consisting of 2–3 simple teeth, some of which have a trace of a single basal denticle on one or both sides; 2–4 pairs of subventral tufts each with 2–4 delicately plumose branches as long as the length of the siphon; these tufts set close to the midventral line, the proximal always arising almost at the base of the siphon; the number of subventral tufts may differ on the two sides; a pair of lateral and subdorsal tufts with 2–4 and 2–5 branches respectively arise from about one-third the way along the siphon, their length about half its diameter; anal segment with an incomplete reduced saddle covering only about one-third of the available surface, with strong spicules on and just before the distal edge; upper caudal seta 4–7 branched, lower with 2–3 banches 5 times as long as the saddle; lateral seta very large with 4–5 branches up to 3 times the length of the saddle; " gills " sausage-shaped, the dorsal 4–5 times as long as the saddle, the ventral a little shorter; ventral brush and barred area entirely absent.

Pupa.—The pupa is easily distinguished from that of the other Ethiopian members of the subgenus so far as they are known, by the combination of deeply notched paddles with a single paddle seta and the presence of two pairs of long subplumose setae on the cephalothorax. The following descriptions of pupae use the nomenclature of Knight and Chamberlain (1948) as modified by Belkin (1952, 1954).

Cephalothorax.—Trumpets (fig. 2*d*) short, expanded distally to form an oblique opening resembling that of *nebulosus*, dark at base, paler towards the tip; in uncrushed specimens the length 3 times the breadth. All hairs delicate except 1 and 5 which are very long and subplumose, 1 with 4 very stout hairs, 5 with 2 or 3 strong but slenderer hairs; 2, 6 and 8 very small, 2–4, 3–4 and 4–5 branched respectively; 4 and 11 short, 4 with 3–4 slender branches, 11 stouter and bifid from half its length. *Abdomen:* Segment I: 1 dendritic with 8 main branches; 2 and 10 short, single, simple; 3 long, single plumose; 4 moderately long, 8 delicate branches from one-third its length; 5 short, single, fimbriated at end; 6 long, single, plumose; 7 half as long as 6, 4–5 delicate branches from just beyond base. II: 0 minute, single; 1 short, 9–10 slender branches; 2 short, spinose, single; 3 moderately long, stout, single, placed medio-caudally to 2; 4 short, 3 slender branches, placed posteriorly to 5; 5 with 3 moderately long slender branches; 6 long, single, stout, subplumose; 7 tiny, single, simple; 10 fairly long, 3 slender branches. III–VIII: 0 tiny, single, slightly longer on VIII; 1 with 3 slender moderately long branches on III–V, 2 branched on VI and VII; 2 very short, single but spinose on VIII; 3 moderately long, single, spinose on III, 3 branched on IV, the branches more delicate on V, short, single on VI, longer with 3 slender branches on VII; 4 short with 3–4 slender branches on III and IV, longer, single on V, 4 branched on VI and VII; 5 short, 5–6 branched on III, long, single subplumose on IV, longer, stouter, single on V and VI, shorter with 2 very slender branches on VII, with 5 simple branches on VIII; 6 long, stout, subplumose, bifid from half its length on III, the 2 branches complete on IV, bifid from two-thirds its length on V, single on VI, 3 strong, markedly plumose branches on VII; 7 short, single, simple on III, spinose on IV–VI, longer with 3 very slender branches on VII, with 7 stout, very plumose branches on VIII; 8 short, 3–4 delicate branches on III, 4–5 branched on IV–VI, longer with 5–6 branches on VII; 10 similar to 8; 11 tiny, single, simple on III–VI, longer with 3 slender branches on VII; 12 moderately long, with 2 delicate branches on III-VII; 14 short, slender, simple on VII. *Paddles:* Ovate, deeply notched, buttress inconspicuous, reaching halfway along the edge; edge with delicate spicules not reaching the paddle seta, which is moderately long, single, simple; no accessory seta.

The type series was bred from larvae found in water in the leaf axils of *Pandanus* in company with larvae of *Uranotaenia ornata* Theobald and *Culex*

(*Culiciomyia*) *liberiensis* sp.n. The larvae were observed to hang perpendicularly in the water and to feed by browsing over the surface of the container. The larvae of *U. ornata* share this habit, which seems to be common to many species breeding in small containers.

Described from holotype male and 2 male paratypes, allotype female and 3 female paratypes and 2 unassociated larval and pupal pelts.

Types.—Holotype male, LIBERIA : Kpain, (7° 9′ N., 9° 5′ W.), 1400 ft., 20.iii.1954, no. L777 P 1., (*Dr. W. Peters*), (incorrectly labelled 7° 10′ N., 9° 07′ W.).

Allotype female, same locality data, no. L776 P 1., pharynx on slide no. LIB/523.

Paratypes, 2 ♂ and 3 ♀, same data, nos. L781, 782, 778, 779, 780, slide no. LIB/444 ; 2 larval pelts on slides no. LIB/436, 392 ; 2 pupal pelts on slides no. LIB/393, 437.

All the above types in the British Museum (Nat. Hist.). Additional larval and pupal pelts in the author's collection. This species is named in honour of Dr. George Way Harley and Mrs. Harley of the Ganta Methodist Mission, Liberia.

2. **Culex (Culiciomyia) liberiensis** sp. n.

This mosquito resembles the other Ethiopian members of the subgenus in which the larval siphon is elongated. The adult may be distinguished from that of *Culex macfiei* Edwards by the absence of acrostichal bristles in the latter and from the other Ethiopian members of the subgenus by the complete absence of scales from the pleurae. The male genitalia are similar to those of the previous species in having a broad lateral plate of the phallosome, but are otherwise quite distinct, with 2–3 barbed accessory leaflets.

Female.—Head : Erect scales on vertex reduced in number and confined to the posterior portion, dark brown and narrow ; decumbent scales largely broad, flat and pale grey or brown, with a distinct rim of white scales medially forming a postocular band ; a few small, narrow pale scales on the occiput, semi-decumbent ; a conspicuous frontal tuft of 2 long, straight, hair-like scales or hairs ; palpi, proboscis and antennae all dark brown, palpi very short. *Thorax :* Dark brown integument covered with minute dark scales except on bare prescutellar triangular and the prealar area ; scutal hairs dark brown, numerous ; acrostichal bristles present, most numerous on posterior half of the scutum ; pleurae pale green or pale brown, darker towards the dorsum, somewhat frosted ; pleural scales completely absent ; one large lower mesepimeral bristle and occasionally a single short hair adjacent to it ; halteres bare, stalk pale green, knob dark brown. *Abdomen :* Tergites all dark brown or with pale patches just apparent at lateral corners of the apices ; sternites 3–7 with a narrow pale band at the apices ; sometimes just extending to the tergites. *Legs :* Dark brown without pale rings at the joints ; hind femur dark dorsally with dark scales expanding to encircle the femur at the apex, mainly pale ventrally up to the apex and expanding to encircle the femur basally. *Wings :* Dark, outstanding scales very narrow. *Pharynx :* Similar to that of the other Ethiopian *Culiciomyia* ; about 10 teeth each side of 8 narrower and slightly longer central teeth.

Male.—Generally resembling the female. *Palpi :* Only slightly larger than the proboscis with specialised scales on the distal half of the shaft very long and thin (fig. 3*f*) ; length of penultimate and last segments in ratio 1 : 1·6. *Terminalia : Style* (fig. 3*a–e*) : curved with a broad membranous flange ; a spinous crest not reaching the upturned tip ; a single small hair below and proximal to the tip. *Coxite :* Lobe undivided with numerous short, simple hairs ; main leaflet rather small, lanceolate ; 2–3 accessory leaflets each

with 2 barbs on the distal edge, one-third to one-half as long as the main leaflet; rods *a*, *b* and *c* dark, *a* shorter and nearly straight, *b* and *c* hooked at the tip; hair *h* a little shorter than main leaflet, expanded slightly in the middle. *Paraprocts:* Fairly broad with a medial basal hook, the outermost processes of the crest thick and longer than the medial spines. *Phallosome:* Lateral plate broadly triangular with a small recurved tooth anteromedially; ventral surface recurved, broad and terminating in 9 or 10 wide teeth. Ninth tergite with lobes flattened, each with about 10 bristles. *Wing length:* About 2·7 mm.

Early stages.—The type series was reared from several batches of larvae, some of which were obtained, together with those of the previous species, in the leaf axils of *Pandanus*. Liaison pelts are included in the series. The siphonal

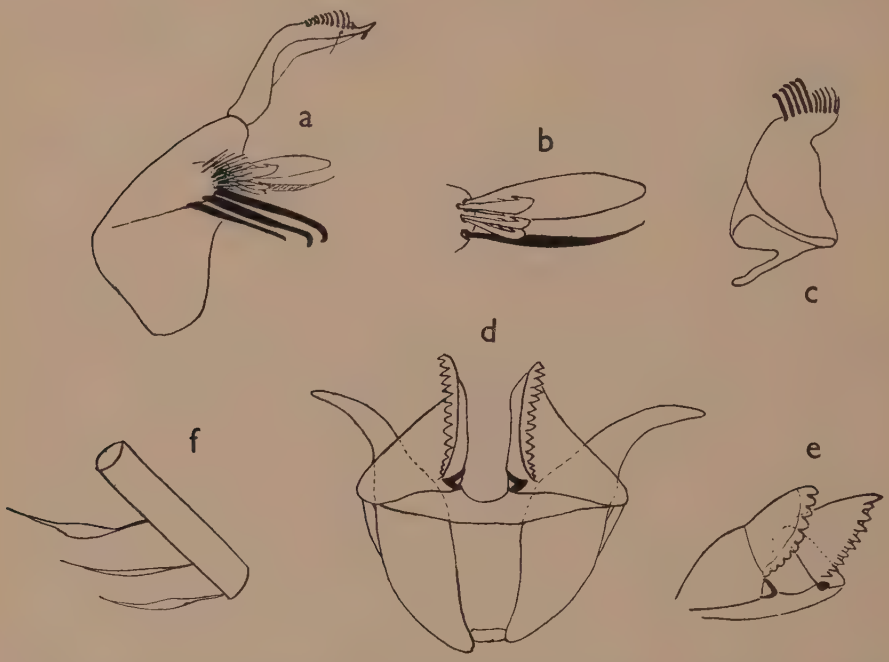

Fig. 3.—*Culex* (*Culiciomyia*) *liberiensis* sp. n. Male. (*a*) Coxite; (*b*) leaflets of coxite; (*c*) paraproct; (*d*) phallosome; (*e*) lateral plates of phallosome rotated; (*f*) distal specialised scales of palpi.

index between 5 and 6, the long subventral tufts and the fringed pecten spines may cause some confusion with larvae of the subgenus *Mochthogenes* Edwards which may be separated by the shorter head setae of the latter. The larva is similar also to that of *macfiei*, from which it is distinguished by the fringed pecten spines and paler siphon. The mentum of the two species is similar.

Larva (fig. 4*a*–*c*).—*Length:* About 5 mm. *Colour:* Head and siphon pale brown, body white. *Head:* Antenna spiculate, tuft of about 25 plumose branches at three-quarters; setae A, B and C plumose, A with 10–12, B 3–4 and C 5–6 plumose branches, B and C at least as long as the head; *d* single, long and simple, *e* fairly long, trifid or with 2–3 complete, delicate branches; mentum similar to that of *macfiei* with 9 teeth on each side of a large central tooth, those at the base largest. *Abdomen:* Comb of 70–80 narrow scales of which the more proximal are smaller than the distal; siphon tapering slightly,

index 8–9 in uncrushed, about 5·2 in crushed specimens ; pecten extending to two-fifths, composed of 12–13 spines which have a fringe of 9–10 delicate denticles extending along the whole ventral edge ; 4 pairs of subventral tufts, the proximal twice as long as the diameter of the siphon, the distal tufts shorter ; each tuft with about 3–4 subplumose branches ; anal segment with a complete saddle on which spicules are developed mostly at the distal edge where they are very long, especially laterally ; upper caudal seta with 2 large and occasionally 1 extra small branch, lower caudal seta single ; lateral seta single, as long as saddle ; ventral brush with about 5 pairs of many-branched tufts ; " gills " slender, lanceolate, equal in length which is 2–3 times that of the saddle.

Pupa.—The pupa, like that of *macfiei* and *cinerellus*, has no long setae on the cephalothorax. It differs from both in having one long and one short paddle seta (fig. 4*d*, *e*).

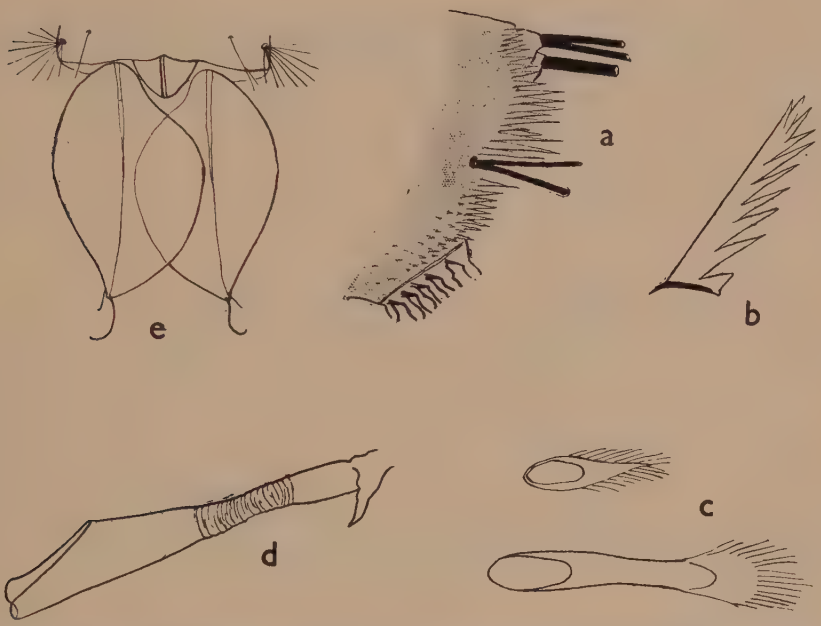

Fig. 4.—*Culex* (*Culiciomyia*) *liberiensis* sp. n. Early stages. (*a*)–(*c*) Larva : (*a*) posterior edge of saddle ; (*b*) typical pecten spine ; (*c*) comb scales of proximal and distal rows. (*d*)–(*e*) Pupa : (*d*) lateral view of trumpet ; (*e*) paddles.

Trumpets : Very long and pale with scoop-like pinna one-quarter the total length. *Cephalothorax :* Hairs 1, 3, 5 and 8–12 of moderate length, slender, simple, with 1–3, 1, 2, 1, 2, 3, 2 and 2–3 branches respectively ; 2 not seen ; 4 and 7 short with 2 and 3 slender, simple branches ; 6 very short, single. *Abdomen :* Segment I : 1 dendritic with 10–11 main branches ; 2, 4, 5 and 7 short with 1, 5, 3–4 and 1 delicate branches respectively ; 3 long, single, serrated ; 6 and 10 moderately long with 1 and 2 branches. II–VIII : 0 single, tiny, simple ; 1 on II tiny with 6–8 branches, moderately long on III–VII with 2, 5, 3 and 2 slender branches ; 2 very short, somewhat spinous, base lateral to 3 on II, medial to 1 on III–VII ; 3 moderately long with 2 simple branches on II, single but trifid from half on III, on IV shorter with 5–6 very delicate branches, base cephalad to 5, 2-branched on V with its base medial and cephalad to 1, single on VI, 2-branched on VII with its base cephalad to 5 ; 4 with 5 short, slender branches on II, 5–6, 3, 6–7, 5 and

2-branched on III–VII ; 5 moderately long with 4 slender branches on II, 6-branched on III, long and plumose on IV–VI with 3, 2 and 2 branches, shorter and simple on VII and VIII with 2 branches ; 6 long, single, subplumose on II, simple, single on III–VI, short with 8–9 slender branches on VII ; 7 very short with 2 slender branches on III, single on IV–VI, 3–4 moderately long, very plumose branches on VII and VIII, the latter 3–6 branched ; 8 short with 4–5 slender branches on III–VI, longer with 5–6 branches on VII ; 10 fairly long with 2 slender branches on II, with 5–6 short, slender branches on III, slightly longer on IV and V with 3 and 7–8 branches, longer, single, simple on VI and VII ; 11 short, single spinose on III–VI with its base lateral to 12 on VI and VII, 2-branched on VII ; 12 moderately long with simple 2 branches on III and IV, longer and single on V and VI, slightly shorter on VII ; 14 tiny, single on VI and VII, more lateral on VIII. *Paddles :* Ovate and pointed ; slender buttress on basal half with delicate spicules ; 2 simple setae, lateral short, medial stouter and longer.

The type series was bred from larvae which were found in abundance in water in the leaf axils of *Pandanus* together with larvae of *Uranotaenia ornata* Theobald and (in two instances) with *Culex* (*Culiciomyia*) *harleyi* sp. n.

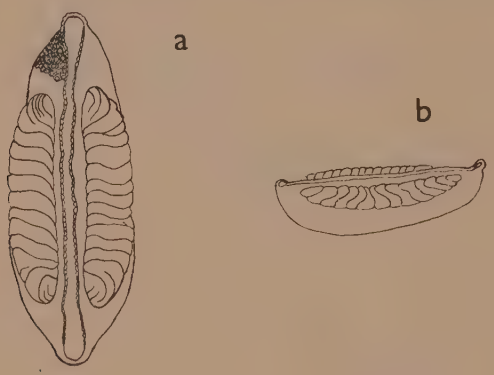

Fig. 5.—*Anopheles* (*Myzomyia*) *barberellus* Evans. (*a*) Egg in dorsal view ; (*b*) lateral view.

Described from holotype male and 14 male paratypes, allotype female and 13 female paratypes, larval and pupal paedotypes and other associated and unassociated larval and pupal pelts.

Types.—Holotype male, Liberia ; Kpain, (7° 9′ N., 9° 5′ W.), 1400 ft., 20.iii.1954, no. L767 (Y/135), (*Dr. W. Peters*). Paedotypes in slide collection nos. LIB/373 and 396.

Allotype female, same locality data, no. L770 (Y/164). Paedotypes in slide collection nos. LIB/378 and 379.

Paratypes, same locality data, Males, L771 (Y/132), 20.iii.1954. L766 (Y/129), 20.iii.1954 and slide no. LIB/448. L872, 13.v.1954, L878, 24.v.1954. L887–895, 20.iii.1954.

Females, L752 (Y/128), 20.iii.1954. L877 24.v.1954 ; slide no. LIB/484.

All the above are deposited in the British Museum (Nat. Hist.). In addition the following are in the author's collection : 2 female and 1 male paratype and associated and unassociated larval and pupal pelts.

The egg of *Anopheles* (*Myzomyia*) *barberellus* Evans.

A small batch of eggs was obtained from a gravid female *A. barberellus* which was captured at rest in a tree hole near Kpain. The eggs were laid on damp filter paper in a small glass vial 3 in. × 1 in. and were examined on the paper when they were about six hours old.

Size.—Length 0·43 mm.; maximum breadth 0·15 mm.; maximum depth 0·11 mm. *Shape* (fig. 5*a*, *b*): Convex below, upper surface almost straight; floats present, 0·3 mm. long with about 15 cells; frill fairly well developed, present over the entire length of the upper surface; deck very narrow, single; floats separated from the deck by a narrow margin of exochorion. *Surface markings:* Upper, lateral and lower surfaces of exochorion with polygonal markings, less apparent below; seen in side view the markings appear to be present only in patches, but are actually present over the whole surface.

Position in key: An additional couplet may be inserted in de Meillon's (1947) key to the Anopheline eggs as follows :—

30 a. Upper surface very narrow, frill much reduced, up to 20 ridges on float . . . . . **theileri**
b. Upper surface narrow, frill moderately developed, about 15 ridges on float . . . . . **barberellus**
c. Upper surface more exposed, frill more apparent, 25–30 ridges on float . . . . . **gambiae gambiae**

Summary.

The adults and early stages of *Culex* (*Culiciomyia*) *harleyi* sp.n. and *Culex* (*Culiciomyia*) *liberiensis* sp. n. are described in detail. The egg of *Anopheles* (*Myzomyia*) *barberellus* Evans is described for the first time.

Acknowledgments.

I am greatly indebted to Mr. P. F. Mattingly of the British Museum (Nat. Hist.) for much helpful advice during the course of this study and for his constructive criticism of the manuscript. I wish to thank Dr. and Mrs. Harley for their very generous encouragement during my stay in Liberia. I am indebted also to the Trustees of the British Museum (Nat. Hist.) for facilities to study specimens in the National collection and to the Director General, World Health Organisation, for permission to publish this paper.

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A NEW SPECIES OF *MEGASTIGMUS* DALMAN (HYMENOPTERA: CHALCIDOIDEA) FROM SEEDS OF *CUPRESSUS TORULOSA* DON.

By R. N. Mathur, M.Sc., Ph.D., F.R.E.S.

(*Systematic Entomologist, Forest Research Institute, Dehra Dun, India.*)

In September, 1951, a small quantity of seeds of *Cupressus torulosa* Don. was received from the Central Silviculturist, Forest Research Institute, Dehra Dun, for examination and report. The seeds were obtained from Kulu, East Punjab, on 9th August, 1951. On examination they were found to be heavily infested with a phytophagous chalcidoid borer. A long series of both males and females of a chalcid fly was bred during September and October, 1951. This chalcid fly is new to science and is here named *Megastigmus cupressi*.

Only three species of *Megastigmus* Dalman have been recorded from India, viz., two species—*Megastigmus indi* Girault and *Megastigmus* sp. by Fletcher (1920) and Ramakrishna Ayyar (1925) respectively, from Coimbatore, S. India; and the third species, *M. albizziae*, by Mukerji (1950) from Delhi. The species recorded by Fletcher and Ramakrishna Ayyar are parasitic species and their original descriptions could not be traced in the literature, while the species described by Mukerji is a phytophagous species, bred from the pods of *Albizzia odoratissima* Benth.

Megastigmus cupressi sp.n.

Female.—Length of body, 2·72 mm. (without ovipositor); width of thorax, 0·6 mm; length of ovipositor, 2·57 mm.

General colour yellowish-brown, abdomen darker. Face, cheeks, frons, and vertex of head, mesothorax, scutellum and propodeum light yellowish-brown; prothorax light yellow with greenish tinge; mesoscutum with a faint V-shaped band; ocelli dark brown; eyes dark pinkish-red; scape and pedicel light yellow, remainder of antenna light brown; tips of mandibles black; legs light yellowish-brown, hind coxae slightly darker basally; abdomen yellowish-brown shading to castaneous; sheath of ovipositor fuscous or black; wings hyaline, iridescent, stigma testaceous, veins light brown.

Head (fig. 17) large, when seen from front slightly wider than long, subsquare, slightly wider than thorax, sparsely pubescent with stiff white hairs arising from black margined punctures; frons, face and cheeks finely obliquely rugulose, vertex with transverse rugae; clypeus very short and broadly emarginate at apex; ocelli placed in a slightly curved line, fine transverse rugae distinct in ocellar area, anterior ocellus slightly larger than lateral ocelli, ocelloccipital line and ocellocular line nearly equal in length, lateral ocellar line a little more than half ocellocular line and posterior ocellar line more than twice lateral ocellar line; eyes large, oval; antennal scrobe glabrous and polished; antennae (fig. 1) 1·26 mm. long, 13-segmented, having fine white pubescence, as long as thorax, scape large, elongate, sparsely beset with stiff hairs, slightly longer than the club segment, pedicel small, narrow basally, ring-segment minute, about half as long as pedicel, funicular segments elongate, unequal, club-joint 3-segmented; mandibles (fig. 9) 3-dentate.

Pronotum (fig. 2) broadly transverse, about twice as broad as long, sparsely pubescent with stiff white hairs, rugosely striate, the striae irregularly transverse, disc gradually sloping anteriorly and somewhat vertically laterally, hind margin irregular, convex. Meso-

thorax (fig. 2) weakly arched, bearing stiff hairs sparsely distributed along the anterior and parapsidal lines ; scutellum with similar hairs along the lateral border and strongly apically margined, rounded ; mesopraescutum and scutellum finely transversely reticulate-rugulose ; scapulae and axillae finely obliquely rugose. Propodeum (fig. 2) small, wider than long, without carinae, coarsely roughened.

Legs (figs. 15, 16) long, sparsely beset with stiff hairs, coxae subtriquetrous, middle coxae smaller than fore and hind coxae, hind coxae stronger than others ; fore femora smaller, slightly curved, as long as fore tibiae, middle femora subcylindrical, about as long as hind femora but slightly smaller than middle tibiae, hind femora subclavate, having a weak basal joint, thicker, slightly smaller than hind tibiae, middle tibiae slightly longer than hind tibiae ; hind tibiae with one apical spur ; claws darker, simple ; pulvilli darker, large and prominent.

Wings (figs. 3, 5) 2·51 mm. long, 1·03 mm. broad, finely covered with minute black hairs and regularly finely fringed, stigmal club narrow and elongate as in fig. 6, not surrounded by a clouded area, stigmal vein slightly smaller than the process, post-marginal vein slightly longer than the marginal vein, basal vein weakly distinct ; hooks on hind-wing, three (figs. 5, 8).

Abdomen (fig. 10) smooth, shining, ovate, moderately compressed, with fine whitish hairs arranged in single rows from third tergite backwards. At the hind end two small prominent tubercles (pygostyli) present bearing few setae.

Ovipositor sheath (figs. 10, 11) shorter than body, black, strongly curved upwards and regularly transversely striate, female genital apparatus (fig. 11) completely hidden in the abdomen.

Male.—Length of body, 3·0 mm. ; width of thorax 0·6 mm. Length of wing, 2·31 mm. ; width of wing, 0·95 mm.

Slightly larger and robust, but size is a variable feature. Sculpture of head and thorax as in the female. Similar to female in general coloration, except that the V-shaped band on mesoscutum is faint but inverted, scutellum with a faint median band, middle and hind pairs of legs and thorax ventrally and laterally slightly darker, occiput and temple dark brown ; abdomen (fig. 13) highly polished and fuscous ; stigmal club (figs. 4, 7) large and broad, surrounded by a very narrow clouded area ; outer genital apparatus and aedeagus as shown (fig. 14).

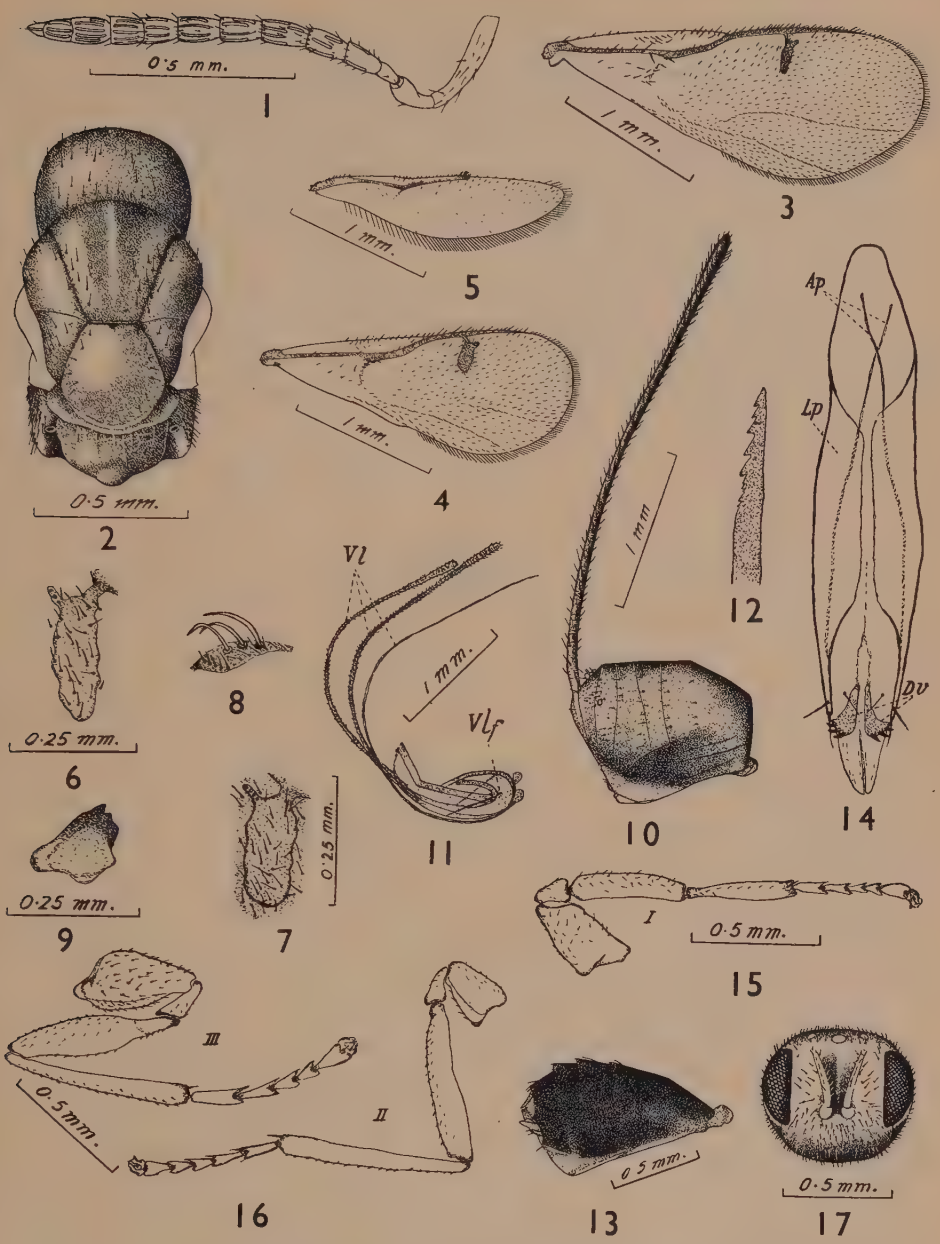
Described from a long series of both sexes ; E. Punjab : Parbati Range, Kulu, 18.ix.51–17.x.1951, Range Officer Coll. All specimens, *type* (♀, 10.x.51), *allotype* (♂, 18.ix.51) and several *paratypes* in the collection of the Forest Research Institute, Dehra Dun.

This species differs from *Megastigmus albizziae* Mukerji in the shape of the stigmal club of the wing, hind legs and other characters, and in coloration, and also in the absence of a mesial pale band in the abdomen of the male.

It is also distinguished from *Megastigmus wachtli* Seitner (Escherich, 1938) by the absence of a median division in the antennal segments and in the shape of the stigmal club of the wing. *M. wachtli* Seitner has been recorded from Istria, Dalmatia (South Central Europe) from the seeds of *Cupressus sempervirens*. The original description of *M. wachtli* by M. Seitner in *Zbl. ges. Forstw.* **42** : 320–321, 1916, was not available.

Summary.

Megastigmus cupressi sp.n. (Chalcidoidea : Torymidae, Megastigminae) has been recorded from Kulu, E. Punjab (India), damaging the seeds of *Cupressus torulosa* Don. Diagnostic characters of this phytophagous chalcid are described.



FIGS. 1–17.—*Megastigmus cupressi* sp. n. (1) Antenna. (2) Dorsal aspect of thorax of female. (3) Fore wing of female. (4) Fore wing of male. (5) Hind wing of female. (6) Stigmal club of female. (7) Stigmal club of male. (8) Hooks on hind wing, highly magnified. (9) Mandible. (10) Lateral aspect of female abdomen, with ovipositor. (11) Female genitalia, *Vl*, valvula, *Vlf*, valvifer. (12) Tip of the ovipositor stylet, highly magnified. (13) Lateral aspect of male abdomen. (14) Male genitalia, highly magnified: *Ap*, apodeme; *Dv*, digitus volsellaris; *Lp*, lamina parameralis. (15–16) Legs, I, II, III. (17) Front view of head.

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NEW ANOPHELINI FROM THE SOUTHERN HIGHLANDS OF TANGANYIKA AND NOTES ON SOME OTHER MEMBERS OF THE GENUS *ANOPHELES* MEIGEN (DIPTERA : CULICIDAE).

By W. Peters, M.B., B.S., D.T.M. & H., F.R.E.S.

Among the examples of the genus *Anopheles* Meigen collected by the writer in Njombe, Tanganyika, from 1951–52 were several of the *Anopheles marshalli* group of the subgenus *Myzomyia* Christophers. The general collection from Njombe has already been reported on (Peters, 1952, 1953). The specimens in the *marshalli* group have now been further studied and fall into three categories, thus :

(*a*) *A. marshalli* Theobald.
(*b*) *A. njombiensis* sp. n.
(*c*) *A. kibena* sp. n.

These specimens were all taken indoors at night or when they were attempting to escape in the early morning. They were not observed to bite man.

Anopheles (Myzomyia) njombiensis sp. n.

Described from holotype female and three paratypes.

Female : Wing length.—3·2–3·3 mm.

Palp (fig. 1, *c*).—Smooth with a few suberect scales basally ; three pale bands as follows : Apical involving apex of fourth and whole of fifth segment, median about as broad as apical covering apex of third and base of fourth segments, basal narrow situated at apex of second segment ; subapical dark band much narrower than apical pale band ; palps all dark on ventral surface.

Pharynx.—Described from a single specimen. Eleven or 12 cones with bulbous bases and fairly long central spines tapering to a very long filament which is equal in length to the rest of the spine ; well marked lateral teeth on cones. Twelve rods with bulbous bases plus a pair of simple teeth on the lateral flanges of the pharyngeal bar. Central spine without filament, moderately long and simple. Post-pharyngeal bar with well marked ridges, which are bare. This resembles de Meillon's (1947) description of *A. marshalli* from the Transvaal, but is unlike the type form from Salisbury, which has about 15 rods and cones and fringed post-pharyngeal ridges (but see later under *A. marshalli*).

Head.—Prominent frontal tuft and pale head scales white.

Mesonotum (fig. 1, *a*).—Clothed with whitish scales arranged as follows : Narrow curved erect scales on anterior third of the central area becoming flatter and broader posteriorly and leaving a bare triangular prescutellar area ; antero-laterally and laterally with flat broad scales and a few narrow scales intermingled postero-laterally ; both types of scales on the posterior edge of the scutellum.

Legs (fig. 1, *d*).—All legs dark brown with very faint pale markings only ; a faint apical pale ring on segments 1–4 of the fore tarsus and a faint pale knee spot on the apex of the hind tibia and base of tarsal segment 1.

Wings (figs. 2, *a*, *b*).—Pale scales creamy-white to white. Costa with the four main pale spots well defined, base with one or two pale interruptions ; base of first vein pale almost as far as the sector spot ; broad sector and accessory sector spots ; well marked

pale interruption in the third main dark area a little proximal to its midpoint; lateral half of first, all of second, third, and fourth, upper branch of fifth, lateral half of its lower branch and all of sixth vein with exceptionally prominent scales set at a wide angle to the

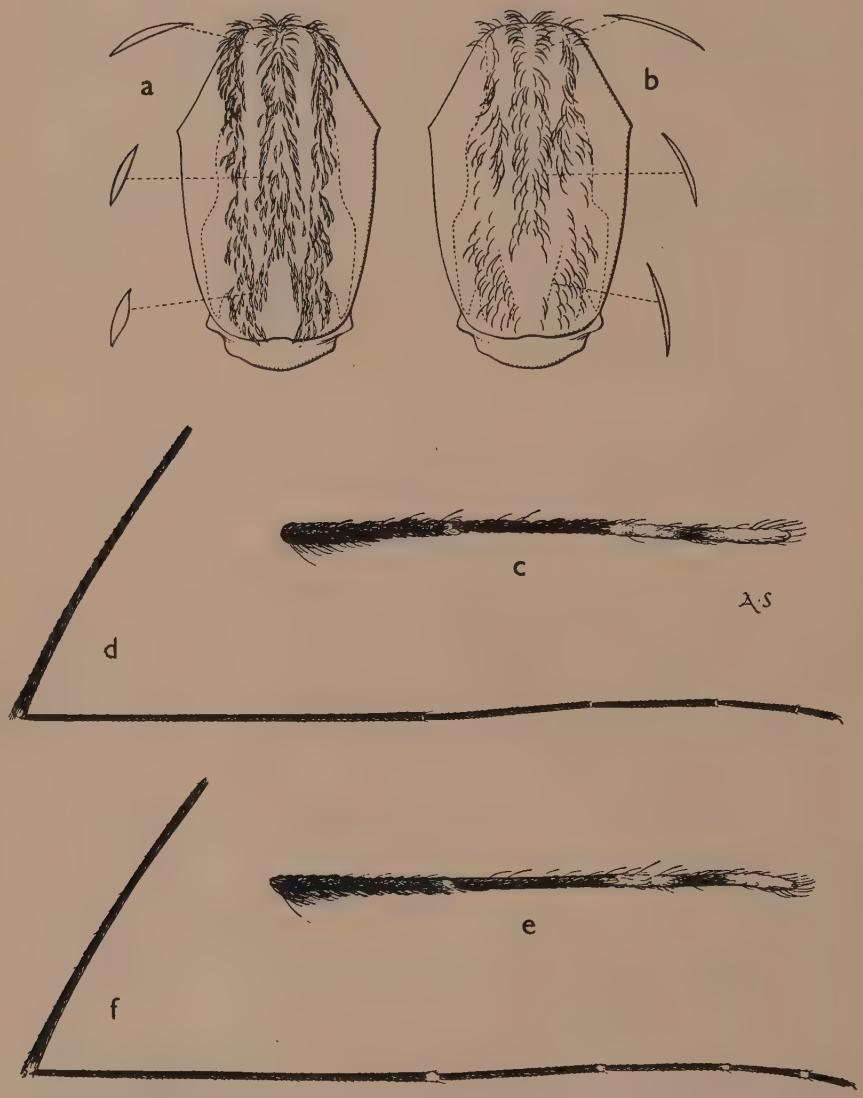

Fig. 1.—*a, c, d. Anopheles* (*Myzomyia*) *njombiensis* sp. n. *b, e, f. A. marshalli* Theobald. *a, b*, Mesonotum; *c, e*, palp of female; *d, f*, hind tibia and tarsus.

veins. These scales long, narrow and blunt-tipped. Markings generally as in *A. marshalli*; third vein pale except for a dark spot at each extremity; basal half of sixth vein with a narrow dark band; fringe with pale spots at apex and tip of each vein.

Abdomen.—No scales even on the cerci.

Male and *early stages* unknown.

The following combination of characters enable this species to be separated readily from *A. marshalli* (fig. 1, *b*, *e*, *f*) : Mesonotal scales predominantly flat and broad ; legs nearly all dark ; most of the wing scales on veins 2–6 very prominent.

Note.—The mesonotal scales of *A. marshalli* in the Njombe area are predominantly narrow and suberect and more numerous than in the present species.

The following couplet may be inserted in de Meillon's (1947) key to separate this species :—

42 . . . . . 42a
. 48

42a No distinct pale rings present on middle or hind tarsi ; most wing scales very prominent . . . . . **A. njombiensis**
Pale rings distinct on some of these segments 43

Holotype, female, TANGANYIKA : Njombe, (9° 20′ S., 34° 35′ E.), 6,000–6,500 ft., 13.v.1952 (*Dr. W. Peters*). In British Museum (Nat. Hist.).

Paratypes, 3 females, same locality data, 9.i.1952, 26.iv.1952, 18.v.1952. In British Museum (Nat. Hist.).

Anopheles (*Myzomyia*) *marshalli* Theobald, 1903.

Eleven females of *A. marshalli* are included in the Njombe collection and are of two types :

(*a*) *Dark-winged forms* (fig. 2, *e*)

Two females corresponding to Evans' (1938) description of Kenya specimens and to a series in the British Museum reared from larvae by Harper at Kericho, Kenya.

(*b*) *Pale-winged forms* (figs. 2, *c*, *d*)

Nine females which match the type form taken by Marshall in Salisbury, Southern Rhodesia. Among these are several wing variations. There are gradations between the dark form ; in which there are one complete and one partial basal pale interruption on the costa, to the lightest specimens, which have two complete interruptions and in which the accessory sector spot may be fused with the sector spot. One specimen has the basal half of vein 6 all pale and another has the stem and lower branch of vein 5 all pale except for small dark spots at the extremities.

Evans notes that " adults evidently representing the paler winged form of *A. marshalli* have also been found in Kenya ". There the dark-winged form appears to predominate. In Njombe the paler form is dominant and from localities south of Njombe the pale forms are the only ones represented in the British Museum.

The pharynx of examples of each of the Njombe forms and of Salisbury and Kericho specimens have been examined. (The specimens are in the British Museum). They were found to vary as follows :

(a) *Njombe pale form* (3 specimens) : 16–18 rods and cones, the latter with broad central spines ending in a long, simple central filament ; conspicuous lateral teeth ; rods very narrow ; post-pharyngeal ridges fringed with very long fibrils.

(b) *Type form, Salisbury* (1 *specimen*) *:* Similar to (*a*) but bases of cones broader, lateral and crest teeth prominent, crest spine tapering gradually with a short filament ; fibrils forming a fringe on the post-pharyngeal ridges.

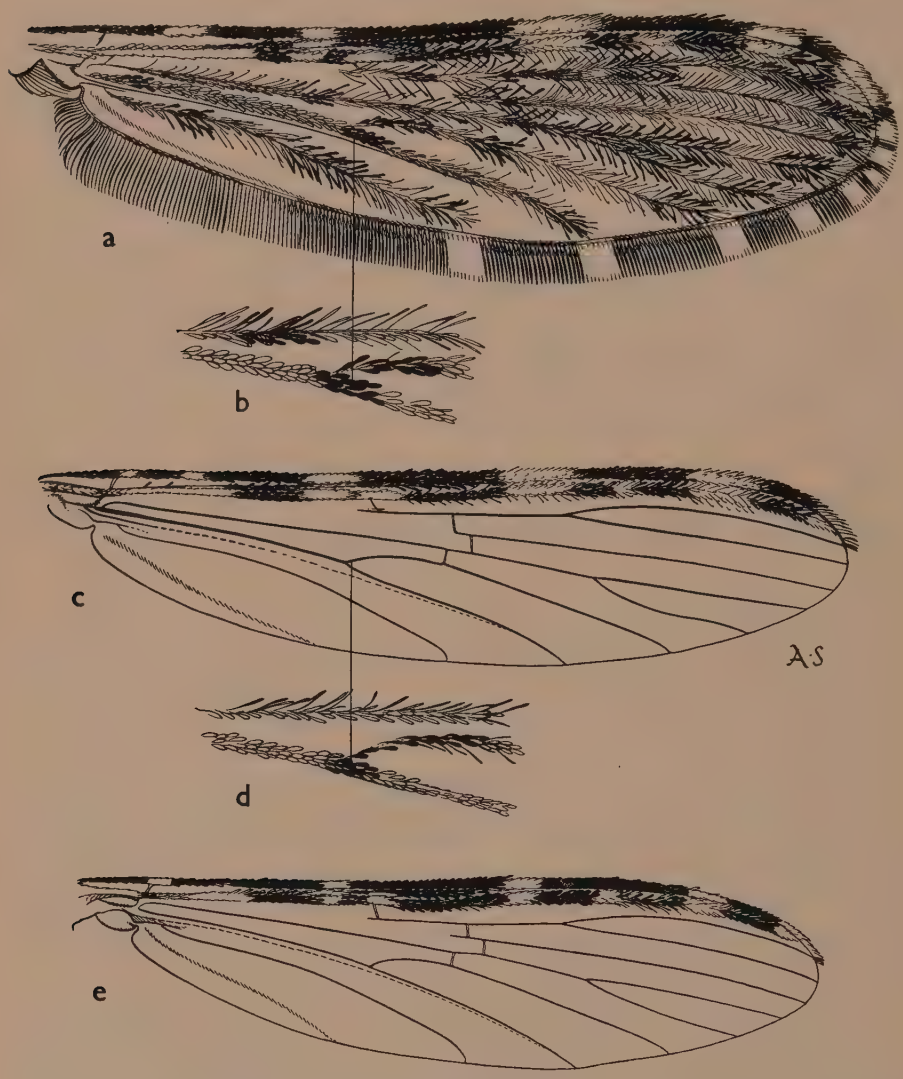

Fig. 2.—*a, b, Anopheles* (*Myzomyia*) *njombiensis* sp. n. *c, d, A. marshalli* Theobald. Njombe pale form. *e, A. marshalli* Theobald. Njombe dark form. *a, c, e,* Wing of female ; *b, d,* fork of vein 5 enlarged.

(c) *Njombe dark form* (1 *specimen*) *:* Similar to (*a*) but fibrils shorter on post-pharyngeal ridges.

(d) *Dark form, Kericho* (1 *specimen*) *:* Cones with crest spines less prominent, lateral teeth present ; rods with bulbous bases and filaments two thirds the length of the cone filaments ; post-pharyngeal ridges bare, not prominent.

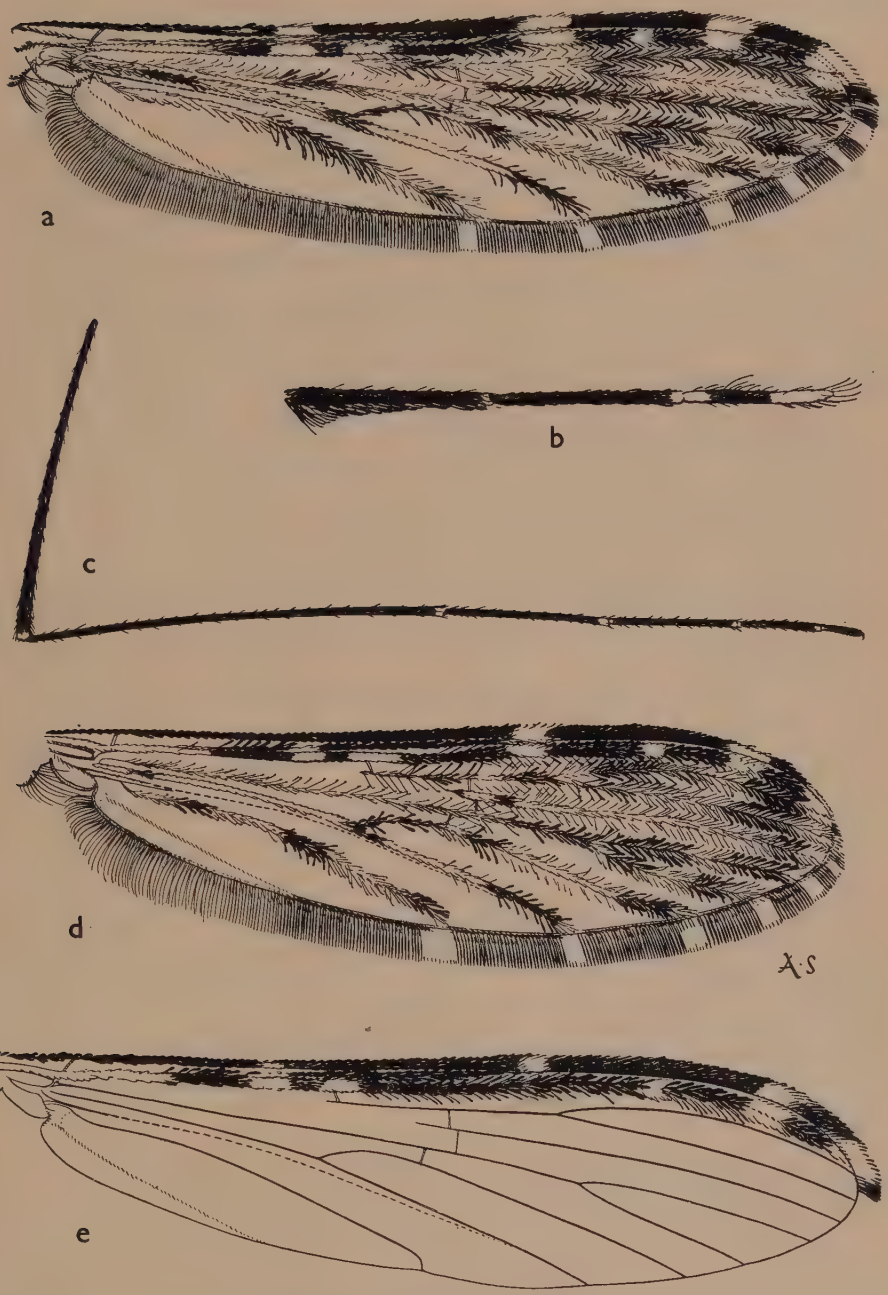

FIG. 3.—*a*, *b*, *c*, *Anopheles* (*Myzomyia*) *kibena* sp. n. *d*, *e*, *A. walravensi* Edwards. *a*, *d*, *e*, Wing of female (*e* to show absence of subcostal pale spot on vein 1); *b*, palp of female; *c*, hind tibia and tarsus.

The new species, *A. njombiensis*, is quite different, with longer cone filaments and fewer rods and cones.

Anopheles (Myzomyia) kibena sp. n.

Described from a single holotype female.

Female : Wing length, 4·1 mm.

Palps (fig. 3, *b*).—Smooth with suberect scales on second segment. Three pale bands as follows : Apical covering apex of fourth and whole of fifth segment separated by dark band of equal breadth from subapical spot situated at junction of third and fourth segments ; this spot half as broad as apical band and absent from the ventral surface ; very narrow basal band at apex of second segment, absent from ventral surface.

Pharynx.—13–14 rods and cones, the latter with their bases well separated, lateral teeth not prominent, numerous crest spines and a long, simple filament. Rods narrow, with the filament half as long as the cones. Bases of cones *not* narrowed as in the Njombe pale form of *A. marshalli* but rather similar to those of the Njombe dark form.

Head.—Scales white, long and mainly club-shaped ; frontal tuft well developed.

Mesonotum.—Mainly clothed with yellow-golden hairs and few scales except for the following areas : Long white hair-like scales on the anterior promontory ; a few similar scales at the sides of the bare prescutellar triangle and on the posterior edge of the scutellum. No pleural scales.

Legs (fig. 3, *c*).—All legs with narrow pale apical rings on tarsal segments 1–4, those on hind leg segments 2 and 3 as broad as long ; faint apical pale spot on hind tibia.

Wings (fig. 3, *a*).—Pale scales yellow. Readily distinguished from related species by the third vein, which is nearly all dark.

Costa with four main pale spots well defined, pale interruptions at base represented by a few pale scales only. Subcosta and first vein pale from the base to near the sector spot ; accessory sector spot well developed, on vein 1 as broad as the sector spot but separate from it ; sector, accessory sector, subcostal and subapical spots about equal in size to each other and to the corresponding spots of the costa ; additional pale spot present at midpoint of third main dark area of first vein, half as broad as the subapical spot. Second vein with a small dark patch near the base, then white up to and including the fork ; upper branch all dark except for a tiny pale spot at the tip ; lower branch with a few dark scales just beyond the fork and at the tip. Third vein all dark except for a minute pale spot at each extremity. Fourth vein with narrow dark band on basal half and a broader band between the 3–4 cross vein and the fork ; fork pale ; upper and lower branches with a pale spot in the centre and at the tip. Fifth vein with a clear, rather narrow black ring at the junction of the inner and middle thirds of the stem ; fork dark, continuing a short distance along the upper branch ; rest of the upper branch pale except for a narrow dark band just before the tip ; tip pale ; lower branch with a broad dark band on the outer half ; tip with a minute pale spot. Sixth vein pale basally almost as far as the midpoint, then dark scaled merging to grey towards the tip. Fringe with pale interruptions at tips of veins 2–6, those opposite 5 and 6 very faint. Outstanding wing scales moderately broad.

Halteres.—Stem white, knob dark brown without scales.

Abdomen.—Without scales even on the cerci.

Male and *early stages* unknown.

This species appears to belong to the *marshalli* group of the subgenus *Myzomyia*, from the other known members of which it may be distinguished by the dark third vein and paucity of scales on the mesonotum. It may be separated from *A. hargreavesi* in de Meillon's key by the addition of the following couplet :

48 . . . . . 48a
. 49

48a Wing with 3rd vein dark except at the extremities . . . . . **kibena**
Wing with 3rd vein mainly pale except at the extremities . . **hargreavesi**

Holotype female, Tanganyika: Njombe, (9° 20′ S., 34° 35′ E.), 6,000–6,500 ft., 1.v.1952 (*Dr. W. Peters*). In British Museum (Nat. Hist.).

Anopheles (*Myzomyia*) *walravensi* Edwards, 1930.

Several examples of this species were identified from Njombe, but a further examination of the available material in conjunction with the series in the British Museum and the *schwetzi* specimens described below revealed some confusion between the two species. This confusion appears to have arisen mainly from the printer's error mentioned below. The illustration of *walravensi* with the dark costal markings in de Meillon's work exactly matches most of our specimens of *schwetzi*.

There are one male and one female from Ndola, N. Rhodesia, in the British Museum, which were identified as *walravensi* by de Meillon. They are slightly different from the co-types from Elizabethville. The female is of the dark form and the male similar to it, but the abdomen of the latter was missing and so could not be dissected. These two specimens match the wing markings of *schwetzi* type and the Njombe series. Mention will be made of a Njombe specimen of *schwetzi* with a trace of a sector spot on the costa. On re-examination of the Njombe *walravensi* it was not found possible to decide in two cases whether to label them as one species or the other. Dissection of the pharynx of a typical *walravensi* from Njombe showed a structure identical to that described and figured by de Meillon. The only difference between it and the pharynx of *schwetzi* that could be seen was the slight gap between the bases of the adjoining cones in *walravensi*. These are in contact in *schwetzi*.

A. walravensi is limited to the Northern Rhodesian, Belgian Congo and Southern Tanganyikan highlands, in the first two localities at about 4,000 ft. The type specimen of *schwetzi* is labelled Kalunga, Katanga, 1,900 metres. The Njombe specimens were found at 6,000 ft. The paratype is labelled simply " Renk, E. Brumpt " but is described in Evans' original paper as coming from Renk, French Sudan. It has not been possible to trace this locality, but there is a Renk or Er Renk in the Anglo-Egyptian Sudan, situated on the White Nile at approximately 11° 30′ N., 33° 0′ E. Professor Galliard (personal communication to Mr. Mattingly) states that it is almost certainly from Renk in the Anglo-Egyptian Sudan that Professor Brumpt obtained his specimen of *schwetzi*.

Anopheles (*Myzomyia*) *walravensi* var. *schwetzi* Evans, 1934. **(stat. nov.)**

The following account is based on the examination of the holotype and paratype females in the British Museum (the paratype on loan from the Liverpool School of Tropical Medicine) and 31 females from Njombe, Tanganyika, 9 of which have been deposited in the British Museum.

The Njombe specimens show some variation from the description given by Evans and some forms are very difficult if not impossible to distinguish from *A. walravensi* Edwards, 1930.

Female : Wing size, 3·8–4·1 mm. (average of 10 specimens, 3·9 mm.).

Head.—The fifth palpal segment may lack the narrow subapical dark band which is, nevertheless, a characteristic of the species. It is composed of rather light brown scales on the fifth segment, the integument of which itself is light coloured. Thus the dark band is never very dark and in many the addition of a few white scales has reduced this dark band completely. The 3-banded palp thus formed is indistinguishable from that of *walravensi*.

Thorax.—Long, narrow white scales present on anterior promontory of mesonotum. Scales in front of the wing root of two shapes, the anterior one broad and the posterior ones mainly slender. Mesonotal and scutellar hairs golden. Both broad and narrow scales present on posterior border of scutellum. No scales present on sides of thorax nor was a spiracular hair observed.

Abdomen.—No scales on cerci of Njombe specimens. An examination of the paratype revealed a few loose scales which are probably stray scales trapped by the hairs.

Legs.—The main constant features of the leg markings are the presence of well marked pale rings on the apices of segments 1–3 of the front tarsi and the absence of pale rings on tarsal segment 4 of all 3 pairs of legs. The other leg markings are variable and range from a complete absence of pale rings on the mid- and hind tarsi to well marked rings on segments 1–3 of both legs (but always with the rings least marked on the hind legs).

Pharynx.—The following description is based on the dissection of 3 females: 14–16 cones with narrow bases, these apparently in contact along the bar giving a saw-edge appearance ; long, delicate, simple filaments. Sixteen rods, very small and with drawn-out points as in de Meillon's illustration of *walravensi*. Post-pharyngeal bar without well marked ridges but with one small bare medial ridge.

Wings (fig. 3, *d*).—Wing markings follow the general pattern as illustrated by Evans except that an accessory sector spot is present on the first vein of all specimens, including the type and paratype. There is apparently a printer's error in Evans' original plate which has been copied ever since. One of the Njombe specimens shows a trace of a sector spot on the costa and this spot is present on the subcosta in all the specimens. A single Njombe female has a reduced subapical pale spot on vein 1, as does the type. The extra pale spot in the third main dark area of this vein varies in position and size but is always separate from the adjacent pale spots. In 6 females the subcostal spot is absent from vein 1 (fig. 3, *e*) and this is associated with the 3-banded palp in one specimen and a general reduction of the pale markings in several others.

In the writer's opinion these two species should be treated as two forms of a single species so that the more recently named now becomes *A.* (*M.*) *walravensi* var. *schwetzi*.

A series of eggs and larvae were preserved as those of *A. walravensi* var. *schwetzi*, but the parent was not preserved. Detailed examination of this batch suggests that they are in fact *A. marshalli*. The eggs are indentical with those of typical *marshalli*. The third instar larvae are almost identical with fourth stage larvae of *marshalli* in general structure.

Anopheles (*Myzomyia*) *rhodesiensis* Theobald, 1901.

One male and four females were reared from larvae found in a swamp adjoining the Ruaha River at Iringa. This record was omitted in the original reports.

Anopheles (*Myzomyia*) *garnhami* Edwards, 1930.

Five out of 19 females from Njombe carried a species of mite (Acarina) on the end of the abdomen.

Anopheles (*Myzomia*) *squamosus* Theobald, 1901.

An additional locality for this species is Iringa, 5,000 ft., where it was reared from larvae obtained together with those of *A. rhodesiensis* from a swamp by the Ruaha River.

Acknowledgments.

The writer is indebted to Mr. P. F. Mattingly for many useful comments during the course of the present study and for reading the proof of this paper, and to the Trustees of the British Museum (Nat. Hist.) for facilities to study specimens in the National collection.

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TWO NEW SPECIES OF CARABIDAE (COLEOPTERA) FROM MAURITIUS.

By J. Vinson, A.M.A., F.R.E.S.

(*Mauritius Institute*)

The Carabid beetles forming the subject of this paper were collected by the writer some twenty years ago, but their description was postponed in the hope that further specimens would be found. As this has not happened after such a long delay it seems preferable to describe these insects rather than to leave them indefinitely unnamed. The types will be deposited in the British Museum (Natural History).

Pterostichinae

Agonocolpodes pterophorus sp.n.

Length 8·2 mm., max. width 3·3 mm. (type); 7·0 mm., 2·6 mm. (paratype).

Brownish-black, moderately shining, with a slight greenish or bronze reflection on the elytra; pronotum reddish-brown; antennae, mouth-parts and legs testaceous.

Head somewhat elongate with eyes rather prominent and genae moderately oblique; ratio width of head (including eyes) to width of pronotum 0·69 (type) and 0·71 (paratype). Anterior supra-ocular setae at level of one-third length of eyes, posterior ones almost at level of posterior edges of eyes. Antennae long, reaching basal third of elytra and equal to half body length, third segment a little longer than fourth (ratio 1·12).

Pronotum transverse, ratio width to length (at middle) 1·44 and 1·41, narrowed at apex with widest part near middle, anterior angles distinctly produced, rounded-acute, posterior angles straight or very slightly obtuse, narrowly rounded, base straight, ratio width of base to width of apex 1·57 and 1·43. Lateral margins explanate and reflexed, narrow anteriorly, wide posteriorly, basal foveae fairly deep and grossly punctate. Anterior pair of setigerous punctures absent, posterior pair present (the setae are actually broken in the type but are present in the paratype). Median line producing on each side a few fairly visible transverse impressions.

Elytra elongate (ratio width to length 0·55 and 0·61), almost parallel-sided, shoulders rounded but distinct, striae distinctly but rather coarsely punctate, intervals almost flat on disc, third one bearing the usual three setigerous punctures, margin slightly sinuate before apex.

Hind wings fully developed. *Hind legs* with tibiae straight, first two segments of tarsi very feebly unisulcate on exterior side.

Microsculpture very light on head, in isodiametric meshes, more visible on pronotum where the meshes are transversely elongate, very distinct on elytra, also in transversely elongate meshes just perceptible at × 16 but well visible at × 32.

Type male, Mauritius: Bassin Blanc, 2.v.1934; Paratype male, Macabé Forest, 23.i.1937. Both collected by scraping light bark and small ferns growing on the trunk of standing trees.

Closely allied to *Agonocolpodes coptoderus* (Dejean), also from Mauritius, a distinctly smaller species (6–6·5 mm.), with atrophied hind wings, ovate elytra, more rounded shoulders and with slightly more oblique genae. The characters

of the aedeagus in the two species are still unknown, but as they are not essential for the diagnosis I prefer to avoid the dissection of the type or of the paratype, for the time being at least. It is my intention to make later a comparative study of the genitalia in all the Agonine beetles of the Mascarenes.

A. pterophorus sp.n. also resembles *A. alluaudi* (Vinson) from Réunion, which is slightly larger (8·8 mm.) darker in colour, the elytra with bluish-green reflections.

The genus *Agonocolpodes* was erected by Jeannel in 1948 (*Col. Car. Rég. Malgache* **2** : 555), as a subgenus of *Neocolpodes* Jeannel, for four Mascarene species included in the old composite genus *Colpodes* MacLeay. Later, in 1951

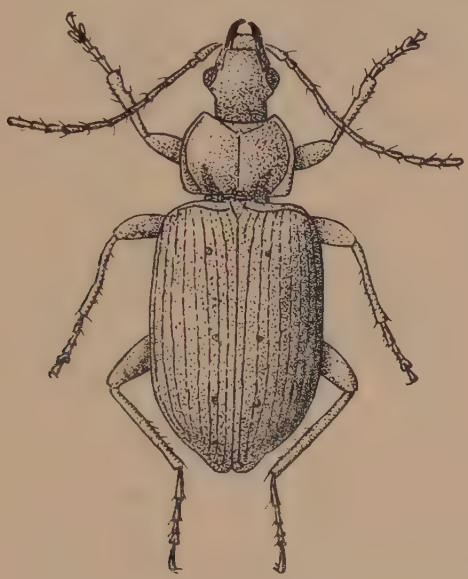


Fig. 1.—*Agonocolpodes pterophorus* sp.n.

(*Mém. Inst. Sci. Madagascar*, (A) **6** : 330) Jeannel raised *Agonocolpodes* to generic status with *Paranomus fischeri* Chaudoir, of Réunion Island, as type. *Agonocolpodes* is mainly characterized by the microsculpture of the elytra, which consists of transversly elongate meshes. It now includes no less than fifty-two malagassic species distributed in four subgenera, of which *Agonocolpodes* s. str. comprises nine species : *A. fischeri* (Chaudoir) and *A. alluaudi* (Vinson), of Réunion, *A. coptoderus* (Dejean) and *A. pterophorus* sp.n., of Mauritius, together with five other species of Madagascar.

Pentagonicinae

Pentagonica mascarenica sp.n.

Length 4·1 mm. ; max. width 1·8 mm.

Brownish-black, with elytral margin testaceous, suture of elytra and margin off pronotum diffusedly reddish.

Head with frons and clypeus slightly but distincly convex and clypeo-frontal suture fairly deep ; genae not distinct from posterior margin of head ; ratio width of head/width

of pronotum 0·81. Antennae (both partly broken) dark testaceous with first segment almost black, fourth segment slightly shorter than fifth.

Pronotum transverse with 1·82 as ratio width/length ; posterior angles very faint but distinct ; margin fairly large and reflexed.

Elytra somewhat more shining than head and pronotum, very superficially but regularly striate-punctate, lateral testaceous margins explanate and reflexed, apical margin truncate and slightly sinuate.

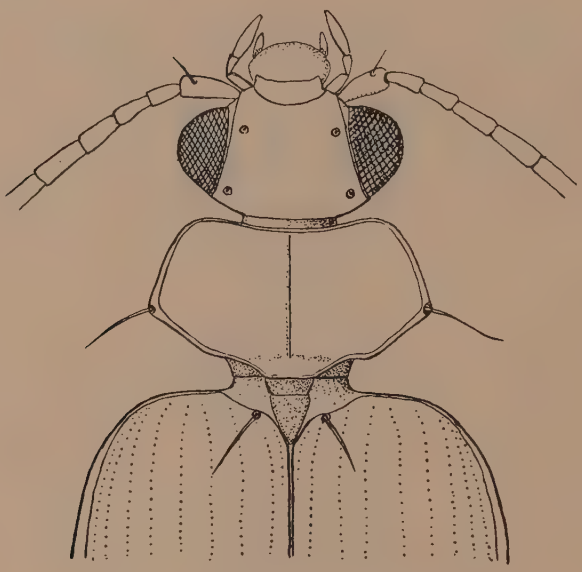


Fig. 2.—*Pentagonica mascarenica* sp.n.

Microsculpture strong, perceptible at × 32, in isodiametric meshes on head, pronotum and elytra.

Legs with femorae darkened very nearly to the tip, tibiae and tarsi testaceous.

Sex not determined and condition of hind-wings not examined.

Holotype, Mauritius : Les Mares, 30.xii.1934, (unique). Collected under moss in the vegetable soil attached to dead tree trunks.

Related to *Pentagonica perrieri* Fairmaire, of Madagascar and Mauritius, in which the posterior angles of the pronotum are totally absent; the elytral striae more deeply impressed, the frons and clypeus not convex. Probably also closely allied to *P. seyrigi* Alluaud, of Madagascar, in which the genae are, however, described as being well developed.

A NEW SPECIES OF *CRYPTOLESTES*[1] (COLEOPTERA : CUCUJIDAE) ASSOCIATED WITH STORED PRODUCTS IN AFRICA.

By W. O. Steel, F.R.E.S. and R. W. Howe, F.R.E.S.

The new species described below was originally obtained from foodstuffs collected by Mr. D. W. Hall, Colonial Liaison Officer of the Pest Infestation Laboratory, and Mr. T. E. T. Trought, Uganda Department of Agriculture, in Uganda in February, 1952. Further examples were later obtained from Nigeria and the Gold Coast, and one specimen was collected at a British port. The insect would thus appear to be already widespread in Africa and capable of introduction into other countries in commerce. Cultures have been easily maintained in the laboratory.

Cryptolestes ugandae sp. n.

Body depressed, moderately shining, reddish-brown, antennae, legs and, usually, elytra, a little lighter, palpi yellowish. Length : ♂, 1·7–2·1 mm., ♀, 1·6–2·0 mm.

Male.—Head transverse, the eyes small and slightly prominent ; width, including the eyes, about as wide as the pronotum, very finely and not very closely punctured and pubescent. Clypeus distinctly emarginate in front over its whole width. Antennae variable in length, 0·65–0·88 times as long as body, all the segments distinctly longer than broad, the second to eleventh subequal in width.

Pronotum transverse, 1·17–1·25 times as broad as long, narrowed posteriorly, the broader the pronotum, the more marked the narrowing, broadest just behind anterior angles, the sides lightly rounded for most of their length, slightly sinuate in front of the posterior angles. The anterior margin lightly sinuate on each side just internal to the anterior angles which are slightly acute and lightly rounded ; the posterior angles rectangular, not rounded, base sharply emarginate on each side, otherwise straight. On each side, not far from the margin, with a fine raised line, the puncturation and pubescence between these lines similar to that on head, puncturation closer and rugose outside the lines.

Elytra as wide as or very slightly wider than the pronotum, about twice (1·96–2·12 times) as long as their joint width, rounded apically ; each with four linear striae, the first of which is indistinct in front, the intervals between the first and second and second and third striae with three rows of very fine setiferous punctures ; elsewhere with similar punctures not arranged in such regular rows.

Chitinised portions of genitalia as in fig. 2.

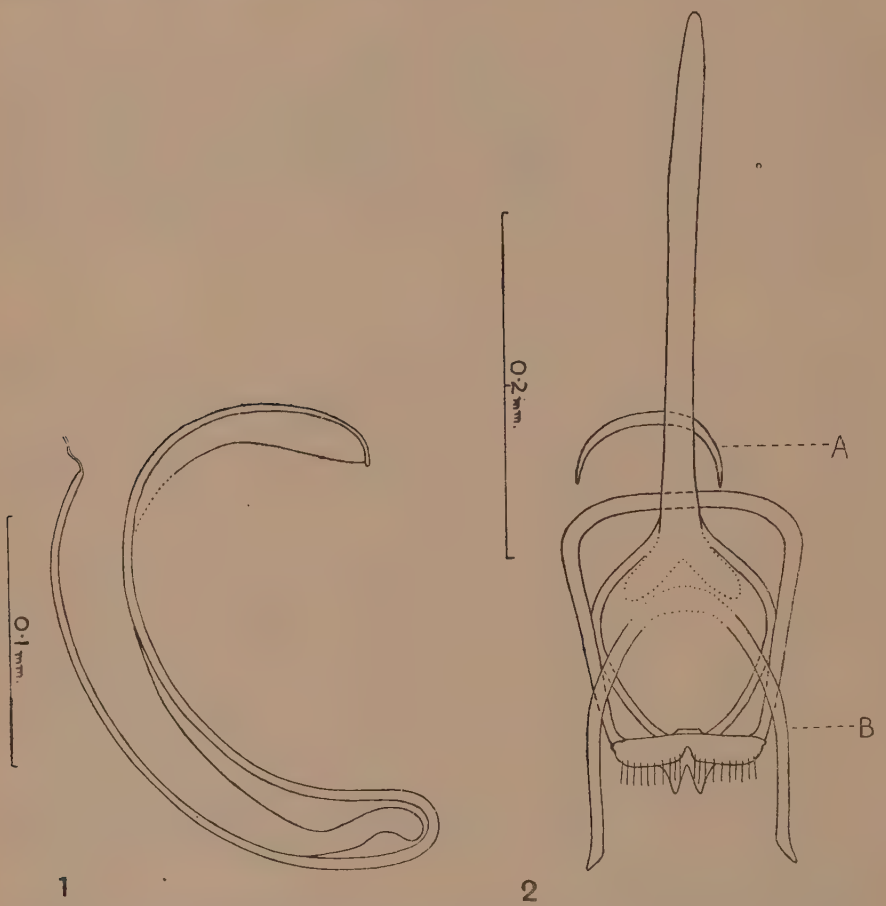
Female.—Head somewhat less transverse, a little narrower than the pronotum. Antennae shorter, 0·50–0·54 times as long as the body, all the segments shorter than in male, the ninth to eleventh longer and broader than the eighth, forming an indistinct three-segmented club.

[1] *Laemophloeus*, as known at present, consists of a number of distinct genera, some previously described and now regarded as subgenera or synonyms and some new. The species recorded as occurring in stored products, with the exception of *janeti* Grouvelle, that is: *spartii* (Curtis) (= *ater* (Olivier)), *minutus* (Olivier), *turcicus* Grouvelle, *ferrugineus* (Stephens) and *pusilloides* Steel and Howe, should be placed in *Cryptolestes* Ganglbauer. *janeti* Grouv. (which is apparently predaceous on other pests) belongs to *Leptophloeus* Casey which has, besides other distinguishing features, short, clubbed antennae and five-segmented posterior tarsi, in *both* sexes. The various genera will be discussed fully at a later date.—W. O. S.

Pronotum less transverse, 1·14–1·20 times as broad as long, less narrowed posteriorly. Puncturation and pubescence as in male.

Spermatheca as fig. 1.

Holotype (♀), allotype (♂) and 56 paratypes taken from cultures bred at the Pest Infestation Laboratory, Slough, from specimens collected at Soroti, Uganda.



FIGS. 1–2.—*Cryptolestes ugandae* sp. n. (1) Spermatheca. (2) Sclerotised portions of male genitalia, viewed from ventral side.

The holotype, allotype and some paratypes will be deposited in the British Museum (Natural History). Other paratypes will be deposited in various museums and some will be retained by the authors.

Records.—UGANDA: Soroti, ii.1952, *ca.* 30 examples in maize cob (*D. W. Hall* and *T. E. T. Trought*); Mbale, ii.1952, 6 examples from mtama millet (as last); Kisoko area, ii.1952, 12 examples from groundnuts and cassava (as last). GOLD COAST: Gonja, xii.1952, 1 ♀ in millet (*D. W. Hall*). NIGERIA: Ibadan, xii.1952, 1 ♀ in cowpeas (*D. W. Hall*). GREAT BRITAIN: Liverpool, on

ship, 24.iv.52, 1 ♀ in East African cowpeas, in company with *C. ferrugineus* (Stephens).

In the structure of the antennae, *C. ugandae* is allied to *C. minutus* (Olivier), *C. turcicus* (Grouvelle) and *C. pusilloides* (Steel and Howe), three species commonly found in stored products. It differs from all three, however, in the distinctly emarginate clypeus, the markedly finer and less close puncturation of the head and pronotum, the shape of the anterior margin and anterior angles of the pronotum, the form of the spermatheca of the female (fig. 1) and the sclerites marked A and B of the male genitalia (fig. 2). It also differs from *minutus* in the more prominent eyes, less transverse pronotum and the longer elytra with three rows of punctures, instead of four, in the intervals between the first and second and second and third striae, and from *pusilloides* in the less transverse pronotum. The length of the antennae in both sexes varies as much as in *turcicus*.

Our thanks are due to Mr. J. Balfour-Browne for facilities for examining material in the British Museum (Nat. Hist.) and to the inspectors of the Infestation Control Division of the Ministry of Agriculture and Fisheries for continuing to send the Laemophloeinae encountered in the course of their work.

SOME WOODWASPS FROM CHILE AND THE ARGENTINE (ORUSSIDAE AND XIPHYDRIIDAE).

By Robert B. Benson, M.A., F.R.E.S.

Through the kindness of Mr. Manfredo Fritz of Buenos Aires and Mr. Ricardo N. Orfila, chief of the Entomological Section of the Museo Argentino de Ciencias Naturales, Buenos Aires, I have been able recently to see a valuable collection of Orussidae and Xiphydriidae from that institution.

The Orussidae consisted of representatives of two species: one of them is an undescribed species of *Guiglia*, a genus previously only known from Australia and New Zealand; the other, representatives of both sexes of *Ophrynopus wagneri* (du Buysson), a species previously only known through its unique type, which, through the kindness of Dr. L. Berland, I was able to borrow from the Paris Museum for comparison with these specimens.

At the same time Professor Middlekauff, of the University of California, has most kindly lent me a specimen of the little known species *Orusella dentifrons* (Phillipi) from Chile, thus enabling me to assess the position of this genus in the Orussidae.

These notes are thus supplementary to my recent paper "Classification of the Orussidae with some new genera and species (Hymenoptera: Symphyta)." 1955, *Proc. R. ent. Soc. Lond.* (B) **24**: 13–23.

Orussidae.

Orussinae.

Orussella Benson, 1935, *Occ. Pap. Rhod. Mus.* **4**: 7. Monotypic. Type species: *Orussus dentifrons* Phillipi, *Stettin. ent. Ztg.* **34**: 305, plate i, figs. 5 *a–e*.

As I have already anticipated in my revision of the classification of the family (Benson, 1955), *Orussella* belongs to the tribe Leptorussini of the Orussinae and the tribe contains three closely related genera: from Australia, from Africa and from Chile respectively. These agree closely in venation and in the absence of the post-orbital and occipital carinae on the head, but can be separated as follows:

Key to Genera of Leptorussini.

1. Scutellar area of mesonotum parabolic behind where it reaches further back than a line joining the front of the cenchri. Broad insects: mesonotum between the tegulae 1·0 to 1·5 times as wide as the medial length to the front of the scutellum. Notaulices on mesonotum not evident. Whole sculpture very coarse 2

Scutellar area in the form of a raised triangle behind, with sharp declivous sides, and the apex not reaching back as far as a line joining the front of the cenchri. Slimmer insect: mesonotum between the tegulae scarcely wider than the length to the front of the scutellum. Notaulices on mesonotum reaching back halfway from the front. Whole sculpture very fine. [Head with only two pairs of separated tubercles on the frons followed by two transverse ridges. Inner hind tibial spur about half length of outer spur. Type species: *Orussus dentifrons* Phillipi, 1873. 1 sp. Chile] . . . . . **Orussella** Benson, 1935

2. Head with three pairs of separated tubercles, encircling the anterior ocellus, and followed by 2–3 transverse ridges behind. Inner hind tibial spur about half as long as outer. [Type species : *Leptorussus africanus* Benson. 1 sp. Africa (S. Rhodesia)] **Leptorussus** Benson, 1955

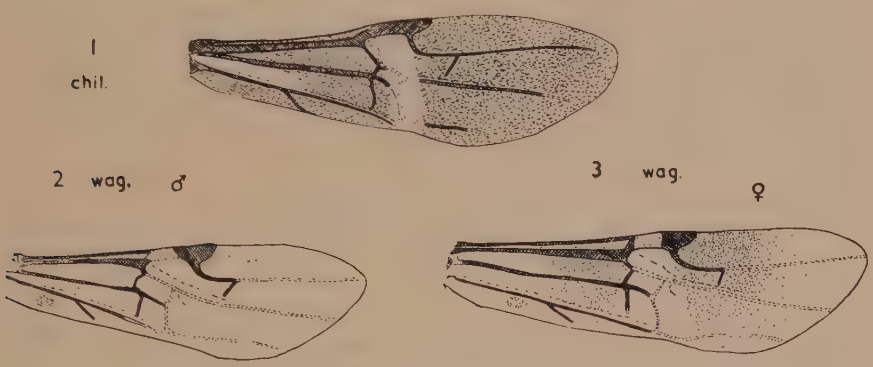
– Head with only two pairs of separated tubercles, arranged beside the hind ocellus, and followed by 2–3 transverse ridges. Inner and outer hind tibial spurs of about equal length. [Type species : *Orussobaius mesembrinus* Benson, 3 sp. Australia (Victoria & New South Wales] **Orussobaius** Benson, 1938

Ophrynopinae.

Ophrynopus wagneri (du Buysson) **comb. nov.**

Orussus wagneri du Buysson, 1910, *Rev. Ent. Caen* **28** : 172.

An examination of the type of this species reveals that it is closely related to *Ophrynopus nigricans* (Cameron) and *O. amazonicus* (Westwood), forming



Figs. 1–3.—Right forewing of : (1) *Guiglia chiliensis* sp. n., ♀ ; (2) *Ophrynopus wagneri* (du Buysson), ♂ ; (3) *O. wagneri*, ♀.

with them a species-group which, having lost the facial carina, was treated by Ross, 1937, inadvisably, as belonging to a distinct genus *Ophrynella* (see Benson, 1955). In the collection from the Museo Argentino de Ciencias Naturales, Buenos Aires, there were four males and seven females of this species from Iliar, Argentine, collected by L. A. Rioja.

The male differs from the female in that the fuscous bands on the fore wings are almost obsolete (*cf.* figs. 2 and 3) ; the subapical band (which is more or less as long as the hyaline apex of the wing) reaches right across to the anal margin of the wing ; the sub-basal band (which fills the apical two-thirds of cell C) spreads across cell R and as far as the fold caused by the vein Cu2. In size the specimens vary from 7 to 11 mm. long.

The species is very similar to *O. nigricans* (Cameron), from Guatemala, in structure but is much larger (*O. nigricans* is only about 4·5 mm.) and has the mesonotum less strongly punctured and between the punctures has shining interspaces which, towards the front margins of the mesonotum, are almost as large as half the diameter of a puncture. (In *O. nigricans* the punctures are very densely packed and, as the ridges between them are dull with surface sculpture, there are no shining interspaces.)

Guiglia chiliensis sp. n.

Female.—Colour black. Fore wings (fig. 1) infuscate except for a hyaline band under the stigma; hind wings hyaline at the base but slightly infuscate in the apical third; stigma and venation black except that the veins of the fore wing are yellowish-white where they cross the hyaline band.

Head with the frontal area enclosed by a carina, and the whole area about as long medially as its breadth in front; its upper transverse marginal carina about two-fifths from the bottom of the eye. Front ocellus surrounded by four pairs of tubercles, behind which are two or three more or less fused together into transverse ridges; lateral ocellus between fourth and fifth tubercle each side and almost touching the eye margin; eyes behind about as far apart as the distance between the hind pair of ocelli. Face densely and coarsely punctured without interspaces between the punctures; but behind the eyes the punctures are separated and have shining interspaces. Antenna with third, fourth and fifth segments subequal.

Thorax and *Abdomen* as in *G. bombycinis* Benson, but the punctures, though very dense, are more clearly defined on the thorax, and the apical tergites are dull with fine surface sculpture between the punctures which are here more scattered. The hind tibia above has a row of 11 tubercles or tubercle-pairs (the third, seventh, eighth and ninth being more or less paired). Length 9 mm.

Male.—As in female, except for primary and secondary sexual characters, which here include the presence of three tubercles on the hypopygium and the obsolescence of the medial carina to the front lobe of the mesonotum.

Holotype ♀, Chile: Canelo, Santiago, xii.1952 (*T. Ramiriz*). (In Buenos Aires Mus.). 1 ♂, same data. (In M. A. Fritz coll.).

This is the first discovery of the genus *Guiglia* outside New Zealand and the Australian region, and one more example of the interesting biological links between this region and Chile.

The species differs from all those previously known in the genus by its much more heavily infuscate fore wings, and in the form of the carinate frontal area of the face which, though no longer than broad, is yet without subsidiary further divisions (see couplet 3 in recent key to the species of this genus, Benson 1955), and also in that, though the legs are all black, the third and fourth antennal segments are scarcely shorter than the fifth (*cf. G. coracina* Benson in couplet 2 of the same key).

Xiphydriidae

Derecyrta jakolewi Tschitscherine, 1894.

One male, apparently belonging to this species, is among the specimens sent to me from Buenos Aires. It was collected in Bolivia at Santa Cruz, ix.1919, by J. Steinbach. This is a very long way from Colombia and British Guiana, where alone this species had been found heretofore. This male differs from the females from British Guiana before me in that the pronotum and the whole of the underside of the thorax and abdomen are dark brown instead of black and that the tergites are dull with fine surface sculpture instead of shining on the raised parts. On the basis of this single male it does not seem to me advisable to decide whether the different colour pattern and denser sculpture on the abdomen indicate a different geographical race or whether they are characteristic of all males of this species.

THE TYPE SPECIES OF THE ANT GENUS *MYRMICA* LATREILLE

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Santschi (1931) drew attention to the unfortunate fact that the genus *Myrmica* Latreille had as type species *Formica rubra* Linnaeus, 1758, an ant whose identity was so obscure that the name could be treated as a *nomen dubium* but for its importance as a generic type. Nylander (1846), Forel (1874) and Emery (1908) in their several dealings with this genus all omitted to include *rubra* Linnaeus as a definite species and Santschi therefore proposed that Nylander's *Myrmica ruginodis* should be synonymised under *rubra* (Linnaeus), the choice having been narrowed down by Emery (1908) to either *ruginodis* or *laevinodis* on account of the statement made by Linnaeus (1767) "*pessime nostratum pungit*" being inapplicable to the other species placed by Nylander in *Myrmica*. Santschi selected *ruginodis* because *laevinodis* was the first named species placed by Nylander in the genus, though, as Stärcke (1951) pointed out, *laevinodis* stings much more fiercely than *ruginodis*; (because of the emphasis on stinging one cannot accept the action of Curtis (1854) who identified *M. rubra* with a species in which the scape of the male antenna was scarcely longer than the terminal segment, i.e. *scabrinodis* Nylander, a species which rarely stings). Now, while Santschi's proposal appeared to put the genus on a firmer footing, it received little attention in Europe and Stitz (1939) retained Nylander's names. In America, however, several authors, including Weber (1947) and Creighton (1950), have followed Santschi, at any rate to the extent of synonymysing *ruginodis* under *rubra*, as also have Brian and Brian (1949) in England. For some extraordinary reason no one seems to have considered looking in the Linnean Collection, except Stärcke who informs us (Stärcke, 1951) that some years earlier he had asked Donisthorpe to examine the type of *Formica rubra* for him and had received the reply that it was too dirty for accurate determination but that it was perhaps *scabrinodis*! Stärcke pointed out that under such conditions it would be impossible to distinguish between *scabrinodis* and *sabuleti* Meinert and that if, as generic type, the name *rubra* could not be suppressed, then a neotype should be chosen from Upsala in Sweden which could be readily dentified with either *ruginodis* or *laevinodis*. Donisthorpe has my full sympathy, for I tried to examine the specimen myself a year or two ago, presumably under similar conditions of hand-lens and somewhat indifferent lighting! Recently however, conditions regarding the examination of the Linnean specimens have been altered and, through the kindness of the authorities of the Linnean Society, I have been able to have on loan all the specimens of *Myrmica*. These consist of eight individuals mounted on six pins and no specimen carries a label of any kind. I have determined them as follows :—

Pin 1. Winged female = *scabrinodis* Nylander.
Pin 2. Winged female (1 wing only) = *scabrinodis* Nylander.
Pin 3 (above). Winged female (no head, 1 wing only) = ? *scabrinodis* Nylander.
(below). Male = *scabrinodis* Nylander.

Pin 4 (above). Winged female (3 wings only) = *scabrinodis* Nylander.
(below). Male = *scabrinodis* Nylander.
Pin 5. Male = *laevinodis* Nylander.
Pin 6. Worker (pinned through gaster) = *laevinodis* Nylander.

Which of these, if any, is the specimen of which Linnaeus wrote " *F. testacea, oculis punctoque sub abdomine nigris* " ? Males by their colour are automatically excluded and, judging by Linnaeus's other descriptions, so can be winged females ; the single worker remains the only possibility and it is, I believe, the original specimen, for on the underside of the first gaster segment, immediately in front of the pin (which emerges through the second segment) is a small but sharply defined black spot, insignificant from a taxonomic point of view but sufficiently distinct under a × 10 hand-lens to have caused Linnaeus to draw attention to it in description. (Dark blotches on the gaster are not uncommon in both *ruginodis* and *laevinodis*, but are rarely so black or so sharply defined as the present one.)

A brief description of this specimen will, I think, suffice to show that it cannot be a *ruginodis*, nor in any way intermediate between *ruginodis* and *laevinodis* (except perhaps in colour), however much one may deprecate forming conclusions from single specimens.

Antennal scape gently curved at the base, without lobe or ridge ; epinotal spines short, scarcely projecting further than the postero-lateral lobes, broad at the base, not curved downwards at the tips but directed slightly upward and outward, the distance between the tips considerably greater than the length of a spine, concavity beneath the spine about equal to the postero-lateral epinotal lobe. Sculpture of thorax weak, epinotum transversally striate above the spines, very faintly so between the spines ; petiole angular in profile, curved behind (not flat-topped and abruptly angled behind as in *ruginodis*), very weakly sculptured. Colour testaceous, perhaps a trifle darker in head than average *laevinodis*.

Frontal index $= \frac{\text{max. width of head through eyes}}{\text{min. distance between frontal carinae}} = 2{\cdot}31$ (*vide* Stärcke, 1927).

Head width/spine length index = 4·25 (*vide* Brian and Brian, 1949) (2·75 for *ruginodis*).

Thus the various speculations as to the identity of *Formica rubra* and the various methods which have been suggested to provide *Myrmica* with a type species prove to have been based on the incorrect assumption that there was no specimen existing which could justifiably be treated as the type. I do not see that any great confusion need arise if this specimen is accepted and I have provisionally labelled it *Formica rubra* Linnaeus, 1758, lectotype. The synonymy of the two species involved is thus :—

1. *Myrmica rubra* (Linnaeus, 1758).
M. laevinodis Nylander, 1846 **syn. n.**
2. *Myrmica ruginodis* Nylander, 1846.
M. rubra auctt, nec Linnaeus, nec Curtis, 1854.

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THE MOSQUITOES OF LIBERIA (DIPTERA : CULICIDAE).

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This is the second of a series of papers based on material collected by the author between April, 1953, and May, 1954, in the Liberian Hinterland and later studied at the British Museum (Natural History). In this paper are described a new species of the genus *Uranotaenia* Lynch Arribalzaga and various hitherto undescribed stages in the life cycles of nine other species of Culicini.

As in the first paper in this series, the nomenclature adopted in the descriptions of pupae is that of Knight and Chamberlain (1948) as modified by Belkin (1952, 1954), the references to which were given in that paper.

Uranotaenia pseudohenrardi sp.n.

This species belongs to the *shillitonis* group of the genus *Uranotaenia*, in which the mesonotal scales are all broad and flat and the acrostichal bristles are absent. It is very similar to *U. henrardi* Edwards, which may be distinguished by its acrostichal bristles and distinctive phallosome.

Male.—Head : Clothed above with broad flat scales which are a pale mauve or brown, depending on the position of the light ; a few erect scales on the nape ; proboscis, palpi and antennae dark. *Thorax :* Integument pale brown except for a round, dark brown patch in front of each wing root ; acrostichal bristles absent, dorso-central and lateral scutal bristles dark and very conspicuous ; mesonotal scales all very broad and flat, the same colour as the head scales ; a patch of similar scales on the *apn* ; the dark patches in front of the wing roots covered with flat broad black scales as in *henrardi* ; pleurae pale brown, paler ventrally ; a row of flat broad white scales on the posterior border of the sternopleura, no scales on the mesepimeron ; spiracular, posterior pronotal and lower mesepimeral bristles single. *Legs :* As in *shillitonis* and *henrardi*, the ventral surfaces of the femora pale, the anterior coxae without scales ; no special secondary sexual characters other than unequal claws on the mid-tarsi. *Abdomen :* Dark brown without markings. *Wings :* All scales dark, the outstanding scales very broad, venation as in *shillitonis*. *Terminalia* (fig. 2 *e, f*) : Ninth tergite as in *shillitonis* without the tooth-like projections of *henrardi*, coxite similar to that of *shillitonis* and *henrardi*, but basal lobe with about 10 equal and rather short bristles ; style short and thick, tapering gradually and ending bluntly ; phallosome with one large beak-like terminal tooth and a simple bulge representing the basal teeth. (*Note.*—The phallosome is rather similar to that of a new species of this genus being described by M. Hamon which is otherwise quite distinct, lacking the dark prealar spot—*personal communication from M. Hamon.*)

Female.—Ornamentation as in the male. The female of *henrardi* has yet to be discovered, but it is probable that the only difference between it and that of *pseudohenrardi* will be the absence of acrostichal bristles in the latter.

Note.—U. henrardi was described by Edwards in 1935 from two males only. One of these from Uganda, Kalinzu Forest, is in the British Museum, where it was available for comparison with *pseudohenrardi*.

Early stages.—Unknown.

Described from 2 males and 1 female found in tree holes.

Types.—Holotype male, LIBERIA : Kpain (7° 9′ N., 9° 5′ W.), 1400 ft., 17.x.1953, no. L672 (*Dr. W. Peters*). (Incorrectly labelled 7° 10′ N., 9° 07′ W.).

Allotype female, same locality data, no. L682, 1.xii.1953.

Paratypes, 1 ♂ from same locality, no. L557, 17.x.1953, (genitalia missing).

The above types and paratype are deposited in the British Museum (Natural History).

NEW DESCRIPTIONS OF CULICINI.

Uranotaenia pallidocephala Theobald, 1908.

Pupa.—Described from one liaison pelt from Kpain, Liberia. *Trumpet* (fig. 1, *d*) moderately long and thin, darker than the integument of the cephalothorax ; pinna continued basally by a short slit. *Cephalothorax :* Integument mainly dark ; most setae moderately long with 6–8 branches ; seta 6 longer and single. *Abdomen :* Segment I : 1 dendritic with 15 or 16 main branches ; 2 single with 3–4 branches ; 6 long, 3-branched ; II–VIII : 1 with 3–6 branches on II–VII ; 5 with 4–6 moderately long branches on IV–VII, single and short on VIII ; 6 with 6 short branches on II–V, 4-branched on VI ; 7 with 4 moderately long, simple branches on VIII. *Paddles* (fig. 1, *b*, *c*) : Broadly ovate, apex rounded, margins with delicate spicules laterally and on the distal half medially ; terminal seta short, single, situated at the apex.

This pupa is very similar to that of *U. philonuxia* which is described below.

Uranotaenia philonuxia Philip, 1931.

Pupa.—Described from one liaison pelt from Kpain, Liberia. Very similar to the pupa of *U. pallidocephala*, from which it may be distinguished by the narrower trumpet and the more medial position of the paddle setae. *Trumpet* (fig. 1, *h*) : Very dark, tracheoid on the basal third, pinna short but continued basally by a slit reaching to the junction of the middle and distal thirds of the trumpet ; sides almost straight, about seven times as long as broad. *Cephalothorax :* Darker than that of *pallidocephala* ; integument dark over the ventral half ; setae mostly 5- or 6-branched except seta 6, which is long and single. *Abdomen :* Dark on the central areas of III–VIII but less so on the last two segments ; segment I : 1 dendritic with about 14 main branches ; 2 single, 3 double, 6 long and double ; II–VIII : 1 with 3–7 branches on II–VII, shorter than in *pallidocephala* ; 5 with 6–7 longer branches on IV–VII, single, trifid on VIII ; 6 very long, double on III, moderately long with 2–3 branches on III–VI ; 7 with 3–5 moderately long, simple branches on VIII. *Paddles* (fig. 1, *f*, *g*) : Broadly ovate with apices slightly pointed ; seta short and single, placed diagonally just medial to the apex ; lateral edge delicately spiculate, distal third of the medial edge more sparsely so.

Larva.—Described from one liaison pelt from Kpain, Liberia. The larva is almost identical to that of *pallidocephala*, but may be distinguished by the less numerous branches of head setae *d*, *e* and *f* and the wider mentum.

Head : Antennae and setae A, B and C as in *pallidocephala* ; setae *d*, *e* and *f* with 3, 3 and 4 branches respectively (9, 4 and 6 in *pallidocephala*) ; mentum (fig. 1, *e*) with apex forming an obtuse angle of about 110° (an acute angle of about 80° in *pallidocephala*—fig. 1, *a*). *Abdomen :* Very similar to that of *pallidocephala* ; comb plate with 5 or 6 spines ; pecten with 11 spines ; subventral tuft of siphon with 20 branches ; lateral seta of saddle with 10 branches ; upper caudal seta 12-branched, lower double.

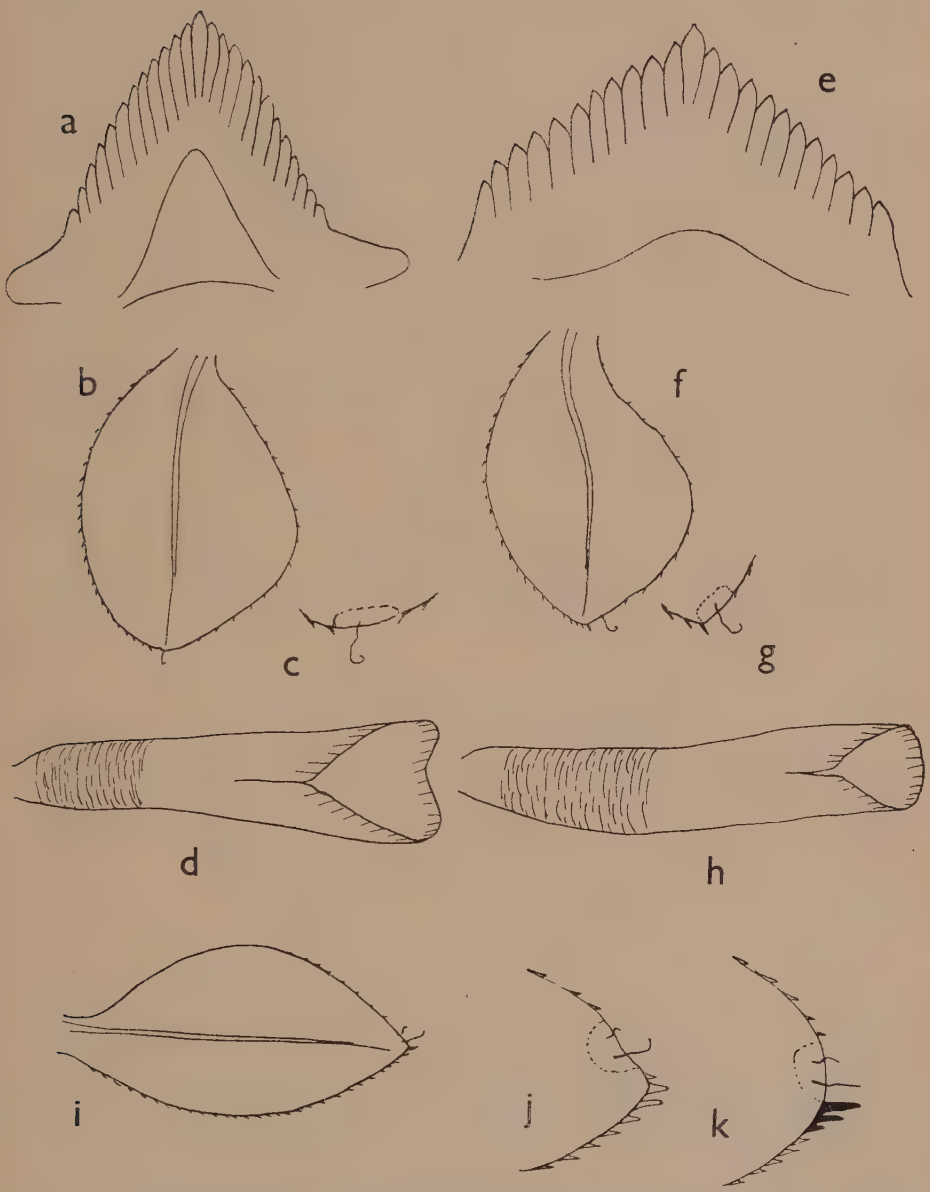

Fig. 1.—(*a*)–(*d*) *Uranotaenia pallidocephala* Theobald. (*e*)–(*h*) *U. philonuxia* Philip. (*i*, *j*) *U. nigromaculata* Edwards. (*k*) *U. mashonaensis* Theobald. (*a*), (*e*) Larva—mentum ; (*b*), (*f*), (*i*) pupa—paddle ; (*c*), (*g*), (*j*), (*k*) pupa—apex of paddle enlarged ; (*d*), (*h*) pupa—trumpet.

Breeding places.—Larvae were found together with those of *U. pallidocephala* and *U. chorleyi* in ground pools.

Uranotaenia nigromaculata Edwards, 1941.

Pupa.—Described from two liaison pelts from Kpain, Liberia. This pupa is almost indistinguishable from that of *U. mashonaensis* Theobald. It differs from the description of the latter given in Edwards (1941) as follows (fig. 1 *i*, *j*) :

Trumpet : Paler at the tip and with a small dark spot on the dorsal surface at the base. *Abdominal segments :* No constant difference noted. *Paddle :* A small main and an accessory paddle seta placed diagonally just medial to the apex. In *mashonaensis* (fig. 1, *k*) these setae are situated at the apex and are flanked laterally by 2 or 3 strong dark denticles.

Larva.—Described from one liaison pelt from Kpain, Liberia. Very similar to that of *mashonaensis* as described in Hopkins (1952). *Head :* Seta A with 6–8 branches, *d* with 6, *e* and *f* with 2 branches, those of the latter very long (*e* and *f* are similar in *mashonaensis* but are not mentioned in Hopkins.) *Abdomen :* Comb with about 13 scales ; pecten of 20–30 scales ; subventral tuft 8-branched ; lateral seta of saddle double ; upper and lower caudal setae double.

Breeding places.—A single larva and pupa were found in very turbid water in a well-shaded swamp pool with little vegetation.

This species may be distinguished possibly by the greater number of branches in the subventral tuft of the siphon (only 5–6 in *mashonaensis*), but this may not prove to be a constant feature.

Uranotaenia chorleyi Edwards, 1936.

The trumpets of the specimens described by Edwards (1941) were missing. They are quite distinctive as follows :

About 5 times as long as broad (fig. 2, *g*) ; darkened at the base, which is tracheoid ; pinna broad and long, giving the whole trumpet a scoop-like appearance.

Described from two pupal liaison pelts from Kpain, Liberia. These agree in all other details with the description given by Edwards.

Ficalbia (*Ficalbia*) *uniformis*, Theobald, 1905.

The descriptions so far published of the larva and pupa of this species are of the var. *malfeyti* Newstead, 1907. Larvae from Kpain agree with the description and with specimens in the British Museum. A series in that collection includes larvae which do not match the description, and among these is one pelt from Balovale, N. Rhodesia. Adults from this town captured at the same time correspond to the type form. This larva is identical with others from Elizabethville, Belgian Congo ; Ukara Island, Tanganyika ; Owerri, S. Nigeria. Adults from these localities are mainly of the type form and it seems likely that the larvae are those of the type form also. Although such larvae were not found in Liberia they are described below as a contrast with the var. *malfeyti*. Further liaison pelts are required to confirm this correlation.

Larva.—Described from a series of whole larvae and pelts in the British Museum from the localities mentioned above. Differs from var. *malfeyti*

(fig. 3, *d–f*) mainly in the antennae, which are dark on the basal two-thirds and the comb spines which are shorter, darker and more numerous than in *malfeyti*.

Head (fig. 3, *a*): Antennae spiculate, infuscated on the basal two-thirds, tuft beyond three-quarters ; clypeal spines simple or with a large basal barb ; setae A, B and C with

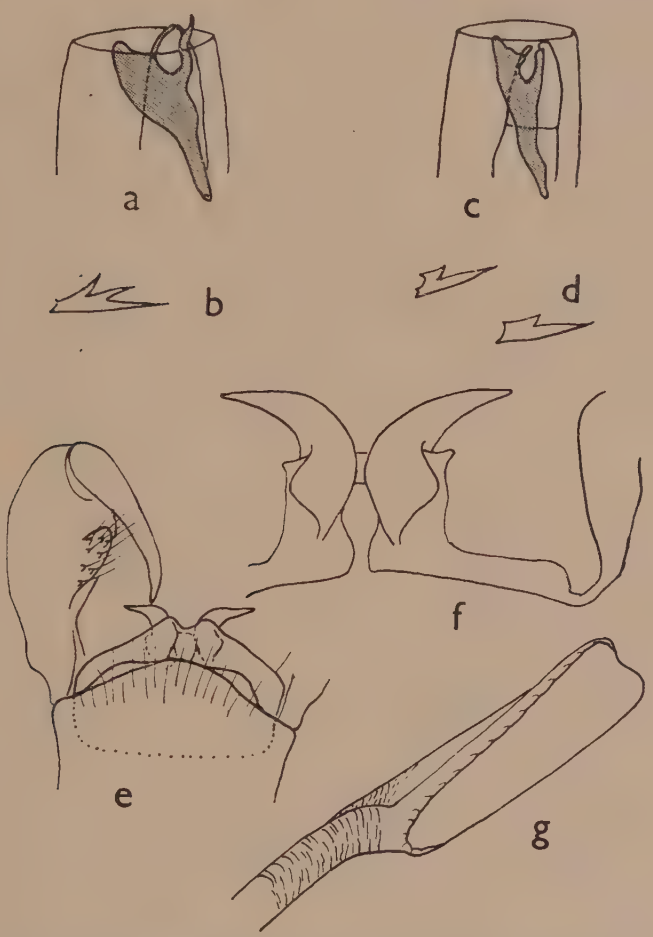

Fig. 2.—(*a*), (*b*) *Culex* (*Culiciomyia*) *nebulosus* Theobald. (*c*), (*d*) *C. nebulosus* var. *pseudocinereus* Theobald. (*e*), (*f*) *Uranotaenia pseudohenrardi* sp. n. (*g*) *U. chorleyi* Edwards. (*a*), (*c*) Larva—" Stirrup-shaped piece " of siphon ; (*b*), (*d*) larva—pecten spines ; (*e*), (*f*) imago—male terminalia ; (*f*) imago—phallosome enlarged ; (*g*) pupa —trumpet.

10–12, 2 and 6–8 branches, *d* with 3–5 branches, *e* long and single, *f* with 5–8 shorter branches. *Abdomen :* Comb with 11–14 spines with a delicate fringe reaching two-thirds (fig. 3, *b*), dark brown or black and slenderer than in *malfeyti, shorter than the pecten spines* (fig. 3, *c*) ; subventral tuft of the siphon with 7–8 branches ; lateral seta of the saddle 4–5 branched, about as long as the saddle ; upper caudal seta 3 or 4, lower 3-branched.

Note.—The larvae of var. *malfeyti* found in Kpain are as follows :

Head : Clypeal spines barbed ; seta A with 11, B ?, C with 5 or 6 branches, *d* 4, *e* single, *f* 6-branched. *Abdomen :* Comb with 6–9 spines which are longer, broader and paler than in the type form and *longer than the pecten spines :* subventral tuft of the siphon with 6–8 branches ; lateral seta of the saddle 5–7-branched, just over half as long as the saddle ; upper caudal seta with 6–8 and lower with 3 branches.

Fig. 3.—(*a*)–(*c*) *Ficalbia* (*Ficalbia*) *uniformis* Theobald. (*d*)–(*f*) *F. uniformis* var. *malfeyti* Newstead. Larva—(*a*), (*d*) Antenna ; (*b*), (*e*) largest comb spines ; (*c*), (*f*) pecten spines. (*b*, *e*, *c*, *f*, to the same scale.)

Aëdes (*Banksinella*) sp. indet., possibly *fuscinervis* Edwards, 1914.

Larva.—The larva of *Aëdes* (*Banksinella*) *fuscinervis* Edwards has not been described. This species occurs along the coast of Liberia together with *Aëdes palpalis* Newstead, to which the present larvae bear a strong resemblance. The following account is based on four larvae which were taken at Kpain, Liberia (May) in a small ground pool together with larvae of *Aëdes yangambiensis*

de Meillon and Lavoipierre. The larvae differ from those of *palpalis* by the presence of pecten spines distal to the subventral tuft in that species and their absence in the present one.

Size : A small species (our specimens distorted in mounting). *Colour :* Not recorded in life ; head capsule and siphon pale, poorly sclerotised. *Head :* Antennae about half as long as the head, tuft of 2 fairly long slender branches arising halfway along the shaft ; antennae weakly spiculate ; head setae A, B and C subplumose, A about as long as the antenna, 5–6-branched ; B and C stout, single, a little shorter than the head ; *d* and *f* lost ; *e* with 3 short slender branches ; mentum shaped as in *palpalis* with 17–18 teeth each side of a small central tooth. *Abdomen :* Comb with 8 strong spines shaped as in *palpalis* with a fringe on the basal half ; setae A, B and C of segment VIII with 8, 13 and 8–9 branches respectively ; siphon poorly sclerotised, index about two and a half in crushed specimens ; pecten extending to two-thirds with 14–15 spines, becoming larger distally, the distal two spines decidedly larger than the rest and with a larger gap between them ; all pecten spines with a single basal denticle and an occasional spine with a minute rudimentary dorsal denticle ; subventral tuft a single delicate short hair placed distal to the most distal pecten spine ; anal segment with a saddle similar to that of *palpalis*, incomplete ventrally, distal edge smooth ; lateral seta double, two-thirds as long as the saddle ; upper caudal seta with 10–12 branches, lower single and 5–6 times as long as the saddle, curled at the tip ; ventral brush with 5 or 6 pairs of tufts in the barred area and 1 unpaired medial tuft proximal to it ; " gills " narrow, lanceolate, the dorsal pair nearly twice as long as the saddle, the ventral pair a little shorter.

Eretmapodites gilletti van Someren, 1949.

Female.—Described from four specimens from a batch which includes typical males, from Kpain, Liberia.

The female may be distinguished from most of the other members of the *chrysogaster* group by the combination of a patternless mixture of black and yellow scales on the mesonotum with a completely dark proboscis. It cannot always be separated from *E. grahami* Edwards, since in that species the pale scales on the ventral surface of the proboscis are often very indistinct or absent. The female resembles the male of *gilletti* in general ornamentation.

Head : Proboscis and palpi entirely dark scaled ; tori and clypeus black ; head scales as in *E. chrysogaster* Graham. *Thorax :* Black and yellow scales on mesonotum patternless except for a tendency to the formation of a yellow rim round the edges and an indistinct medial yellow line in front of the scutellum ; integument dark brown ; black scales predominant, giving the mesonotum a darker appearance than in *chrysogaster* or *grahami*. *Legs :* Colouring as in the male ; hind femora with a distinct silvery apical spot, which is represented on the mid-femora by a few silvery scales. *Abdomen :* As in *chrysogaster*.

Larva.—Described from six liaison pelts from the same batch as the adults, including the female paedotype.

In general appearance very similar to the larva of *E. pauliani* as described by Grjebine (1950), but differs in having only 2 pairs of pecten teeth, less spines in the comb and only 3 branches to the upper caudal seta (6–8 in *pauliani*). It may be distinguished from the larva of *chrysogaster* by its broader head with shorter antennae, fewer comb spines (14–20 in *gilletti*, 19–40 in *chrysogaster*), a shorter siphon and an extra branch in the upper caudal seta.

Size : Not measurable, as no whole larvae available, but smaller than *chrysogaster*. *Colour :* Apparently similar to *chrysogaster*. *Head :* as in *pauliani*, a little broader than

long ; antennae and antennal tufts as in *pauliani* ; mentum with 9 teeth on either side of a central tooth. *Thorax :* As in *chrysogaster*. *Abdomen :* Chitinised tubercles as in *chrysogaster*, not elongated, as in *pauliani* (this is a variable feature in larvae of this group and may prove to be inconstant in *pauliani*) ; terminal segments similar to *pauliani* but only 2 pecten spines (fig. 4, *a*) on each side with 3 or 4 very small basal denticles ; comb with fewer spines (14–20), which are variable in shape (fig. 4, *b*) but mostly with a long central

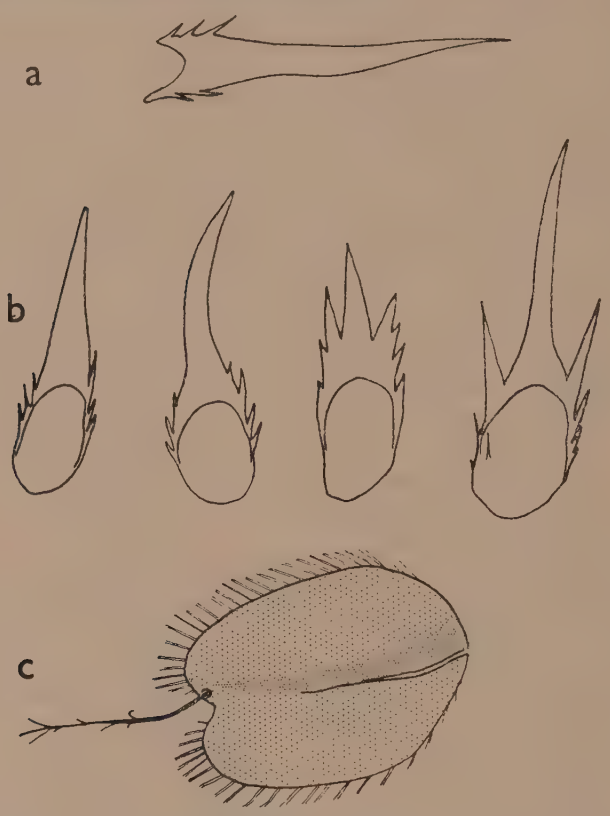

Fig. 4.—*Eretmapodites gilletti* van Someren. (*a*) Larva—pecten spine ; (*b*) larva—comb spines ; (*c*) pupa—paddle.

spine and minute basal denticles ; siphonal tuft single, stout, branched in the middle and at three-quarters producing 4 branches in all ; siphonal index about 1–1·5 ; saddle with rows of fine spicules distally, lateral seta with 2 very short branches ; upper caudal seta with 3 branches, lower double ; ventral brush of 4 pairs of setae, of which the proximal is small and single, the middle two long and single and the distal longer and bifid ; " gills " lanceolate, about 5 times as long as the saddle, equal.

Pupa.—Described from six liaison pelts from the same batch, including the female paedotype.

This pupa is very similar to those of the other members of the genus in which the paddle hair is single. It differs from that of *chrysogaster* in having several of the long abdominal setae double or bifid and from that and *pauliani* by having a deeply notched paddle. The general characters are those of the group.

Colour : As in *chrysogaster*. *Size :* Smaller than *chrysogaster*. *Trumpets and cephalothorax :* As in *chrysogaster*. *Abdomen :* Segment I : 1 with 12 fairly long, subplumose branches ; 2 short and single but longer than in *chrysogaster ;* 3 very long and plumose ; 4 with about 8 very short branches ; 5 very short, single ; 6 with 3 very short branches ; 7 short and single ; 10 with 8 delicate branches as long as the breadth of the segment. II : 1 very long, thick and plumose, single or bifid ; 3 longer than 1, single ; other setae all very short, 2, 4–7 and 10 with 1, 2, 1, 6, 1–2 and 5–6 branches respectively. III–VIII : 1 minute, single ; 2 very short, single ; 3 very long, stout and single on III, minute and single or double on IV–VII ; 5 very long on III–V, shorter on VI and VII, but still longer than half the depth of the segment on VII ; tiny, double on VIII ; 5 may be double or bifid on IV–VII, but always on at least one or two of these segments ; 4 and 6 very short on all segments, single or double ; 7 minute on II–VI with 5–10 long plumose branches on VII, 4–10 branches on VIII ; 10–14 minute on all segments. *Paddles* (fig. 4, *c*) *:* Longer than broad, deeply notched at the apex ; edge with a long fringe of paired hairs except in the notch ; seta single, a little shorter than or equal in length to the paddle, very stout and plumose with a frayed appearance.

Types.—Allotype female and paedotype, Liberia : Kpain, (7° 9′ N., 9° 5′ W.), 1400 ft., 26.x.1953, no. L624, slide collection nos. LIB/316 and 295, (*Dr. W. Peters*). (Incorrectly labelled 7° 10′ N., 9° 07′ W.).

Allotype, paedotype, 1 ♀, 2 ♂ with liaison larval and pupal pelts in British Museum (Natural History). Other examples in the author's collection. All the above from a single batch of larvae obtained in a tree hole.

Culex (*Culiciomyia*) *nebulosus* Theobald, 1901.

Mattingly (1953) stated that *nebulosus* and *nebulosus* var. *pseudocinereus* Theobald, 1901, which is a non-urban variety common in East Africa, are indistinguishable in the larval stage. Peters (1953) reported the occurrence of the latter form in the Southern Highlands of Tanganyika. The Tanganyika material has now been re-examined and compared with that of the type form from Liberia and elsewhere. Larval pelts from Njombe, Tanganyika, corresponding to the var. *pseudocinereus* differ from those of the type form as seen in Liberia. Of the other examples in the British Museum some agree with the Tanganyika and some with the Liberian form, while others are intermediate. The first are from Elizabethville, Belgian Congo and Lagos, Nigeria. The second are from Takoradi, Gold Coast ; Ibadan, Nigeria ; Coyah, Forecariah and Dubraka, French Guinea ; Yaoundé, French Cameroons ; Elizabethville and Luluabourg, Belgian Congo and Balovale, N. Rhodesia. There are intermediate forms from Elizabethville, Ibadan and Lagos. Both forms of the adult are known to occur in Elizabethville. Larvae from the Anglo-Egyptian Sudan differ from all the others and should probably be described as a distinct form. I propose the following description as that of

Culex (*Culiciomyia*) *nebulosus* var. *pseudocinereus* Theobald.

Larva.—Described from three larval pelts from Njombe, Tanganyika.

The larva is similar to the description of the type form in Hopkins (1952) but differs as follows :

Abdomen : Pecten spines with only 1 denticle and a broader base than the type form (fig. 2, *b*, *d*) (the pecten spines of *nebulosus* ss. usually have at least 2 denticles) ; the " stirrup-shaped piece " of the siphon (Breland, 1952) narrower and the concavity more oval than in the type form (fig. 2, *a*, *c*).

Note.—Our studies have confirmed the suggestion of Breland that the "stirrup-shaped piece" of the siphon may prove to be of value in studying closely related forms of Culicine larvae.

Culex (*Culex*) *schwetzi* Edwards, 1929.

Pupa.—Described from three pupal liaison pelts from Kpain, Liberia.

The pupa is similar in general form to that of *C. grahami* Theobald and other species of this group, but may be separated from them by its shorter trumpets and the details of the abdominal chaetotaxy, such as the long double setae 5 on IV–VI curled at the ends.

Trumpets : Index about 5, pinna simple, basal two-fifths of the meatus dark brown and tracheoid (fig. 5, *e*). *Cephalothorax :* Lower and anterior portions and posterior part of the dorsum dark brown ; setae 1–3 moderately long with 3 delicate branches ; 5 and 7–11 moderately long with 4–5, 2, 3–4, 2, 6–8 and 2 delicate branches respectively ; 4, 6 and 12 short with 2–3, 2–3 and 4–6 branches. *Abdomen* (fig. 5, *g*, *h*) *:* Centre of segments I–VII darker brown, especially I–III. Segment I : 1 dendritic, about 15 main branches ; 2 short, single ; 3 fairly long, bifid at tip ; 4 short with 4 branches ; 5 very short with 2–4 branches ; 6 very long, simple, single ; 7 short, bifid at tip ; 10 fairly long, 2-branched. II : 0 tiny, single ; 1 a short, brush-like seta on a wide, flat base ; 2 short, single ; 3 with 3 fairly long, delicate branches, its base medial to 2 ; 4 short with 2–4 delicate branches, its base caudal to 5 ; 5 with 3–5 moderately long, delicate branches ; 6 very long, single, simple ; 7 tiny, single, base distal to 10 ; 10 fairly long with 2 delicate branches. III–VIII : 0 short, single on III–VII ; 1 with 7 moderately long, simple branches on III, 5 on IV and V, 3 on VI and 2 on VII ; 2 very short, single on III–VII, base lateral to 1 on VII ; 3 with 2 fairly long branches on III, 3–4 shorter ones on IV and V, 2 longer branches on VI and VII ; rather short with 2 branches on III and IV, fairly long, single on VI and VII ; 5 with 6–7 moderately long, delicate branches on III, 2 very long, strong, subplumose branches on IV–VI curled at the tips, moderately long, single, simple on VII, slightly longer with 2 simple branches on VIII ; 6 with 3–4 delicate, moderately long branches on III–VI, a short tuft of 6–8 hairs on VII ; 7 tiny, single on III–VI with 5 strong plumose branches on VII, 7–10 on VIII ; 8 short with 5–6 branches on III and IV, slightly longer on V and VI, longer still with 3 branches on VII ; 10 longer than 8 on III–V with 6–7 branches, long, single, simple on VI and VII ; 11 very short, single on III–VII, may be double on IV and has its base lateral to 12 on VI ; 12 with 2 moderately long, simple branches on III and IV, single on V–VII ; 14 tiny, single on III–VIII, its base more lateral on VIII. *Paddles* (fig. 5, *f*) *:* Broad, slightly flattened on the lateral part of the apex, buttressed to just beyond a half with a few very delicate spicules along the buttress only ; apical seta short and delicate, sometimes bifid ; accessory seta medial to it, shorter, single ; central rib a rather conspicuous broad tube extending almost to the seta then ending abruptly

Larva.—Described from one whole larva and two larval liaison pelts from Kpain, Liberia.

The larva of *C. schwetzi* is almost identical with that of *Culex perfidiosus* Edwards, 1914. Head setae B and C are only 2-branched in *schwetzi* and the mentum is different, having fewer and larger teeth.

Head : Antenna infuscated on a very small area at the base and beyond the tuft spiculate, tuft of 20 plumose branches just beyond a half ; subterminal setae half as long as the antenna and equal to the longer of the terminal setae ; short terminal seta one-third as long as the longer one ; setae A, B and C with 7, 2 and 2 branches, about as long as the head, *d* single, fairly long, *e* and *f* short with 3–5 branches ; mentum (fig. 5, *b*, *d*) with 11 teeth on each side of a large central tooth. *Abdomen :* Comb with 20–25 small scales as in *perfidiosus:* pecten of about 9 spines not reaching a half, the spines long with 2 or 3 basal denticles ;

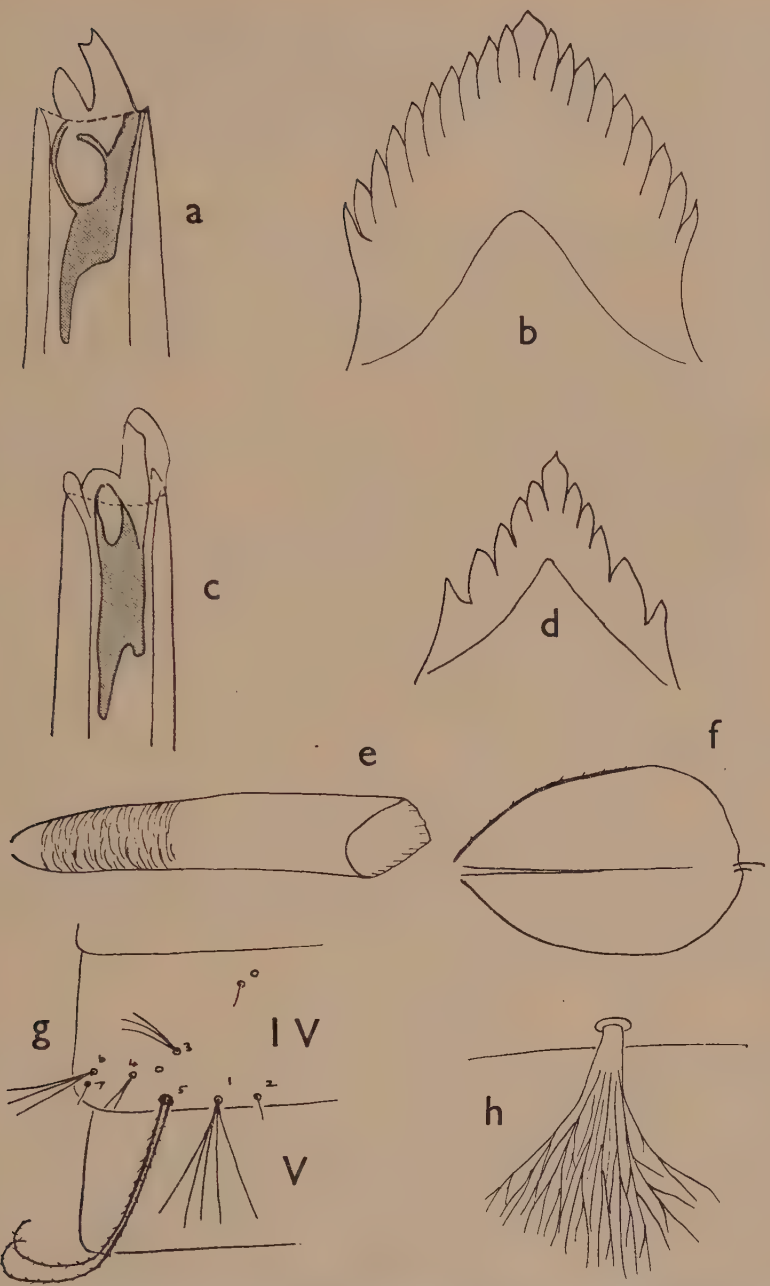

FIG. 5.—(*a*), (*b*) *Culex* (*Culex*) *perfidiosus* Edwards. (*c*)–(*h*) *C. schwetzi* Edwards. Larva—(*a*), (*c*) " stirrup-shaped piece " of siphon ; (*b*), (*d*) mentum. Pupa—(*e*) Trumpet ; (*f*) paddle ; (*g*) abdominal segment IV ; (*h*) seta 1 of segment II.

4 long and 1 short pairs of subventral tufts longer than the diameter of the siphon, the longest with 3–5, the shortest with 5–7 branches, all the tufts being very close to the midventral line ; " stirrup-shaped piece " with narrower concavity than that of *perfidiosus* and with the posterior part of the base prolonged proximally for a short distance (fig. 5, *a*, *c*) ; saddle complete, distal margin smooth ; lateral seta single, less than half as long as the saddle ; upper caudal seta with 2 branches, lower single ; ventral brush with 5 pairs of branched setae ; " gills " short, pointed, about as long as the saddle, the ventral pair slightly shorter than the dorsal.

Breeding places.—Stagnant water in rock pools in the middle of a river.

Summary.

Descriptions are given of the following species in the stages shown :

Uranotaenia pseudohenrardi sp. n.	Male and female.
U. pallidocephala Theobald	Pupa.
U. philonuxia Philip	Pupa and larva.
U. nigromaculata Edwards	Pupa and larva.
U. chorleyi Edwards	Pupal trumpet.
Ficalbia (*Ficalbia*) *uniformis* Theobald	Larva.
Aëdes (*Banksinella*) sp. indet.? *fuscinervis* Edwards	Larva.
Eretmapodites gilletti van Someren	Female, pupa and larva.
Culex (*Culiciomyia*) *nebulosus* var. *pseudocinereus* Theobald	Larva.
Culex (*Culex*) *schwetzi* Edwards	Pupa and larva.

Examples of all the above species have been deposited in the British Museum (Natural History).

Acknowledgments.

I am greatly indebted to Mr. P. F. Mattingly of the British Museum (Natural History) for much helpful advice and for reading the proofs of the paper, and to the Trustees of the British Museum for permission to study specimens in the National collection. I wish to thank the Director-General, World Health Organisation for permission to publish this paper.

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DELPHACIDAE FROM JUAN FERNANDEZ (HOMOPTERA : FULGOROIDEA).

By R. G. Fennah, B.A., F.R.E.S.

The following descriptions of Delphacidae are based on material collected in the Juan Fernandez group of islands by Fr. F. G. Kuschel and forwarded to the British Museum (Natural History). It is through the kindness of Dr. W. E. China and the authorities of the British Museum (Natural History) that the writer has been able to examine this collection—a privilege which he here gratefully acknowledges.

The Juan Fernandez group lies some 380 miles west of Valparaiso, and comprises two main islands, Mas-a-Tierra and Mas-a-Fuera, and the islet of Santa Clara. Mas-a-Tierra and Mas-a-Fuera, on which the present collections were made, lie a hundred miles apart. Mas-a-Tierra reaches a height of 3,225 feet (El Yunque) and is extremely rugged.

No earlier reports appear to have been made on Fulgoroidea from the group so that the present collection, though small, is of considerable interest. The bulk of the collection falls into six species of the alohine genus *Nesosydne*, while the Delphacini are represented by two species : seven are new to science, and differ from known species in structural details of the male genitalia.

As far as described species are concerned *Nesosydne* is known only from Hawaii and (as *Ilburnia*) the Marquesas, but Zimmerman (1948 : 173) reports the presence of species of the genus (or of closely allied genera) in the Society, Austral and Mangareva Islands. This indicates a wide distribution in the South Pacific and Hawaii. The genus does not occur in Micronesia, and has never been reported from South America, where the few known alohine genera are profoundly different. In view of the relatively rich speciation within the genus in Juan Fernandez the conclusion appears inescapable that this part of the fauna is of South Pacific origin and furthermore is not of recent arrival.

Nesosydne Kirkaldy

Kirkaldy, 1907, *Proc. Hawaii. ent. Soc.* **1** : 161. Orthotype, *Nesosydne koae* Kirkaldy, *loc. cit.*

Muir (1919 : 6 ; 1919*a* : 48) sank *Nesosydne* under *Ilburnia* White. Zimmerman (1948 : 171) considers the known material of *Ilburnia* to be too scanty to permit the conclusion to be drawn that the two genera are really the same. The writer has examined the material seen by Muir, and provisionally is disposed to recognise *Nesosydne* as separate. It is probable that Muir's views on the relationship between *Ilburnia* and *Nesosydne* were influenced by his knowledge of the asiracine *Ugyops*, some members of which seem fully as far apart as these two genera, yet, in a general conspectus, cannot be segregated.

The difficulty lies in assessing the value of the differences : the following are the chief to be noted between *Nesosydne koae* and *Ilburnia ignobilis*, the respective type species.

Antennae longer than head and thorax, basal segment longer than second : basal segment of rostrum reaching post-coxae, apical segment reaching base of abdomen, vertex more or less imperceptibly curving into frons from basal disc ; pronotum as long as mesonotum, pronotal disc as long in middle as broad across base or practically so, strongly tricarinate with lateral carinae straight, reaching hind margin almost in line with mesonotal carinae ; mesonotum tricarinate with median carina reaching to apex of scutellum; head very much narrower than pronotum, its width, including eyes, subequal to length of basal antennal segment ; pronotum laterally carinate ; species large . . . . . **Ilburnia ignobilis**

Antennae not longer than vertex and pronotum combined, basal segment shorter than second ; basal segment of rostrum reaching half way between pro- and mesotrochanters, apical segment scarcely surpassing mesotrochanters, if at all, vertex in profile subrectangulately rounding into frons ; pronotal disc twice as broad as long, lateral carinae strongly diverging and not reaching hind margin ; mesonotum tricarinate, mesoscutellum inflected dorsad towards apex, ecarinate ; head practically as wide as pronotum, its width, including eyes, more than four times length of first antennal segment ; pronotum not laterally carinate ; species small . . . . . **Nesosydne koae.**

As can be judged by comparing them with the following descriptions, most of these differences are of no more than specific value, so that Muir's contentions cannot be dismissed as untenable on present data. The question will have to be reconsidered when it is possible to examine the male genitalia of *Ilburnia ignobilis*. For the present *Ilburnia* stands apart from *Nesosydne* in its relative antennal size and proportions, in the longer rostrum, in the much narrower head relative to the width of the pronotum and in the percurrent median mesonotal carina.

Until more is known about variation in alohine genera the position of *Delphax simulans* Walker (Galapagos Is.) must remain obscure. The calcar is concave on one side and bears sixteen teeth on the margin : the species may be delphacine.

No biological data accompany the specimens, but it is worth noting that many were found to have the sporangia of ferns adhering to the integument.

Key to Juan Fernandez species of *Nesosydne*.

1	Lateral margins of pronotum as long as eye in same line, strongly subfoliately carinate	**vulcan***
	Lateral margins of pronotum short, not nearly as long as eye in same line, not at all carinate	2
2	Antennae with segments of equal length	**sappho***
	Antennae with basal segment shorter than distal	3
3	Tegmina much surpassing abdomen, heavily infumed, membrane mostly pale, wings fully developed ; basal antennal segment as long as broad	**oreas***
	Tegmina not or scarcely surpassing abdomen, not marked as above, wings absent ; basal antennal segment longer than broad . . .	4
4	Frons widest just distad of middle, distinctly incurved to suture ; calcar 11 toothed	**calypso***
	Frons widest three-quarters from base or even nearer to apex . . .	5
5	Calcar 9 toothed ; M once forked distad of transverse veinlets .	**philoctetes***
	Calcar 11 toothed ; M simple to margin	**minos***

* Described as new below.

Nesosydne sappho sp. n. (Fig. 1, A–G.)

Antennae with second segment as long as first, first longer than wide at apex (3 : 1), second longer than broad (3·2 : 1). Frontal carina forked at curvature into vertex. Rostrum slender, attaining post trochanters, apical segment only slightly shorter than subapical. Tegmina slightly surpassing apex of abdomen ; wings absent. Post-tibiae laterally two-spined, apically five-spined. Calcar with eight teeth. Basal metatarsal segment six-toothed, second segment four-toothed.

Testaceous-fuscous : margins and carinae of head, a row of six or seven spots in each compartment of frontal disc, two submarginal spots on pronotum near tegulae, lateral carinae of mesonotal disc, posterolateral margins, and scutellum, rostrum, mesocoxae, postfemora at base, post-tibiae at apex, mesal surface of calcar, basal metatarsal segment distally, pale testaceous or stramineous. Frons pallid near frontoclypeal suture.

Tegmina hyaline with yellowish-brown suffusion ; a suffusion at base of clavus, a spot on margin at union of claval veins, another spot on margin just distad of apex of clavus and a spot at node, fuscous ; distal margin of tegmina pallid.

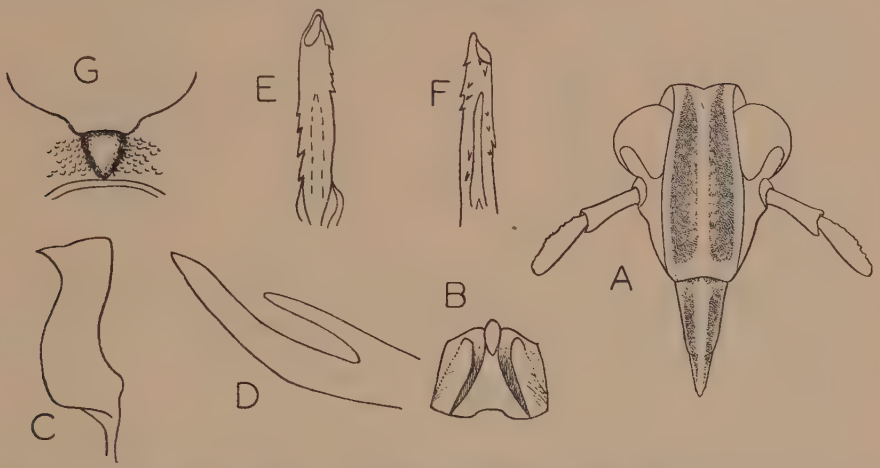

Fig. 1.—*Nesosydne sappho* sp. n. A, Frons and clypeus ; B, anal segment of male, posterior view ; C, right genital style ; D, sketch outline of aedeagus, right side ; E, apex of aedeagus, ventral view ; F, apex of aedeagus, dorsal view ; G, armature of diaphragm.

Anal segment of male with lateroapical angles rather closely approximated, each produced ventrad in a long stout spine curved ventrad and laterad. Pygofer with diaphragm moderately narrow in middle portion, dorsal margin concave and further subangulately excavate in median portion, surface granulate, with a medial armature consisting of a subtriangular sclerotised ridge, with apex directed ventrad and base extended cephalad in a smooth plate. Aedaegus slender, comprising the main limb, which ascends obliquely distad and is beset with about 21 teeth, and a laterally-compressed ensiform accessory limb arising dorsally at base of main limb and directed caudad above it ; orifice of aedeagus ovate, on left at apex. Genital styles not long, rather broad throughout with inner margin concave, outer convex in basal third, concave in middle third, and convex distally, apical margin obliquely subtruncate, inner angle subacuminatedly produced ; deflexed slightly at tip.

Male : Length, 4·2 mm. ; tegmen, 4·8 mm.

Female : Length, 5·9 mm. ; tegmen, 4·8 mm.

Holotype and nine males and twenty-three females Juan Fernandez : Mas-a-tierra ; Cerro Yunque, 915 m., 10.ii.1952 ; Picacho Central, 600 m.,

4.ii.1952; P. del Yunque, 200 m., 2.i.1952, 12.ii.1952, Oreja de Conejo, 400 m., 23.ii.1951; Alto Pangal, 600 m., 6.ii.1952; Alto Inglés, 600 m., 6.ii.1952; Miradero, 500 m., 31.xii.1951; Alto Francés, 450 m., 7.iii.1951; Mas-a-fuera; Las Chozas, 700 m. 14.i.1952 (*F. G. Kuschel*). Holotype male from Cerro Yunque.

Nesosydne minos sp. n. (Fig. 2, A–G.)

Antennae with second segment longer than first (2 : 1) first segment longer than broad (1·8 : 1), second longer than broad (3·6 : 1). Frontal carina forked at curvature into vertex. Rostrum scarcely attaining post-trochanters, apical segment about four-fifths length of subapical. Tegmina reaching to apex of abdomen; wings absent. Post-tibiae laterally two-spined, apically five-spined; calcar eleven-toothed, basal metatarsal segment with six teeth, second metatarsal segment with four teeth.

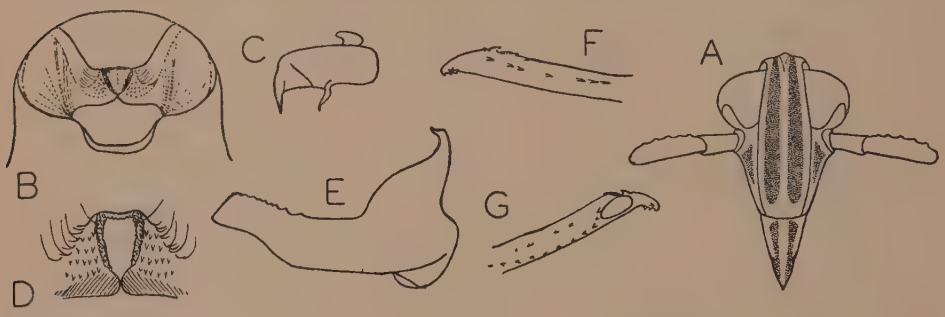

Fig. 2.—*Nesosydne minos* sp. n. A, frons and clypeus; B, pygofer, posterior ventral view; C, anal segment of male, right side; D, armature of diaphragm; E, right genital style, side view; F, apical part of aedeagus, right side; G, apical part of aedeagus, left side.

Intercarinal areas of frons and clypeus, pronotum in middle of disc and behind eyes, intercarinal areas of mesonotum, procoxae in basal half, mesopleurites, a lighter suffusion on meso- and post-femora distally, post-tibiae at base and apex and post-tarsi, fuscous-piceous.

Tegmina hyaline, a spot on margin at node and at apex of united claval veins, Sc + R, M and Cu fuscous-piceous; transverse veinlets subhyaline, margin distad of claval apex pallid.

Anal segment of male with lateroapical angles each produced ventrad into a very short stout spine. Pygofer in posterior view wider than deep, laterodorsal angles not at all produced; diaphragm deep at sides, moderately narrow at middle, dorsal margin broadly concave, submedian areas with about four rows of granules, median armature in form of a broad subtriangular sclerotised ridge with apical part of triangle obsolescent. Aedeagus relatively short, ascending and tapering distad with orifice on left subapically; ten teeth on upper margin, five teeth ventrolaterally on right, and about nine on left. Genital styles very broad in basal third, much narrower in median third, and still narrower, and directed obliquely, in distal third.

Male: Length, 3·6 mm.; tegmen, 2·8 mm.

Holotype ♂ and ten males and nineteen females, Juan Fernandez: Mas-a-tierra; Cerro Yunque, 915 m., 10.ii.1952; Picacho Central, 600 m., 4.ii.1952; Cerro Chumacera, 22.ii.1951; Cerro Alto, 600 m., 1.ii.1952; Miradero, 550 m., 15.ii.1951, 31.xii.1951; Q. d.l.Laura, 1.iii.1951; Alto Inglés, 600 m.,

6.ii.1952; Alto Pangal, 600 m., 6.ii.1952; Villagra, 21.ii.1951; P. del Yunque, 200 m. 9.ii.1952; Mas-a-fuera, Las Chozas, 700 m., 14.i.1952; Q. d.l. Vacas, 17.i.1952 (*F. G. Kuschel*). Holotype male from Cerro Yunque.

Nesosydne oreas sp. n. (Fig. 3, A–F)

Antennae with second segment longer than first (2 : 1) first segment only slightly longer than broad (1·2 : 1), second segment longer than broad (3·3 : 1). Frontal carina forked at curvature into vertex. Rostrum attaining post-trochanters, apical segment scarcely shorter than basal. Post-tibiae laterally two-spined, apically five-spined. Calcar ten-toothed. Basal metatarsal segment six-toothed, second metatarsal four-toothed. Tegmina much surpassing apex of abdomen. Wings fully developed.

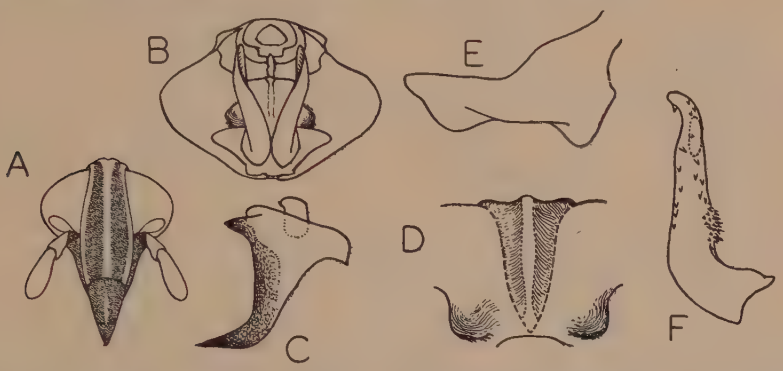

FIG. 3.—*Nesosydne oreas* sp. n. A Frons and clypeus; B, male genitalia, posterior view; C, anal segment of male, right side; D, armature of diaphragm; E, right genital style, side view; F, aedeagus, right side, orifice seen by transparency.

Piceous; carinae of frons and vertex, and of pronotal disc, rostrum and legs stramineous. Hind margin of mesonotum interruptedly testaceous. Tegmina translucent, costal cell and anal angle lightly, corium between Sc + R and claval margin heavily, infuscate, especially along the veins. Veins concolorous, transverse veinlets white. Wings pearly grey with veins dark fuscous.

Anal segment of male short, with apical margin transverse with lateroapical angles scarcely or not prominent, a pair of long very stout processes arising ventroapically, directed ventrad then caudad. Pygofer in posterior view much wider than deep (dorsoventrally), laterodorsal angles not produced; diaphragm deep, dorsal margin weakly convex in middle third, a pair of tumescences near ventral margin visible just laterad of genital styles; armature elongately triangular, smooth, rising from each side to a strong median T-shaped ridge, upper margin shallowly triconvex, slightly incised just laterad of armature. Aedeagus strongly ascending distad and sinuately tapering, curved caudad at apex; orifice distinctly subterminal on left side, a minutely denticulate elevated area on dorsal margin near base, about sixteen other denticles distributed as figured.

Genital styles in side view broad and subquadrate in basal third, median third much narrower, parallel-sided, apical third a little wider with apical margin oblique. In posterior view styles ascending subvertically, tapering from base to slightly twisted apical quarter.

Male: Length, 3·0 mm.; tegmen, 3·6 mm.

Holotype ♂ and nine males, JUAN FERNANDEZ: Mas-a-tierra; Cerro Chumacera, 22.ii.1951; Q. d.l. Laura, 1.iii.1951; P. del Yunque, 200 m., 9.ii.1952; Cerro Yunque, 915 m., 10.ii.1952; Picacho central, 600 m., 4.ii.1952; Alto Pangal 600 m., 6.ii.1952; Cerro Alto, 600 m., 1.ii.1952. Two

males and one female Juan Fernandez labelled "1", "9", "1" respectively (*F. G. Kuschel*). Holotype male from Cerro Alto.

Nesosydne calypso sp. n. (Fig. 4, A–F)

Antennae with second segment longer than first (1·6 : 1), first segment longer in anterior view than wide at apex (1·7 : 1), second longer than broad (2·7 : 1). Frontal carina forked at curvature into vertex. Rostrum scarcely attaining post-trochanters, apical segment about three-quarters length of subapical. Wings absent, tegmina reaching to apex of abdomen. Post-tibiae laterally two-spined, apically five-spined, basitarsus seven-toothed, second metatarsus three- or four-toothed, post-tibial calcar eleven-toothed.

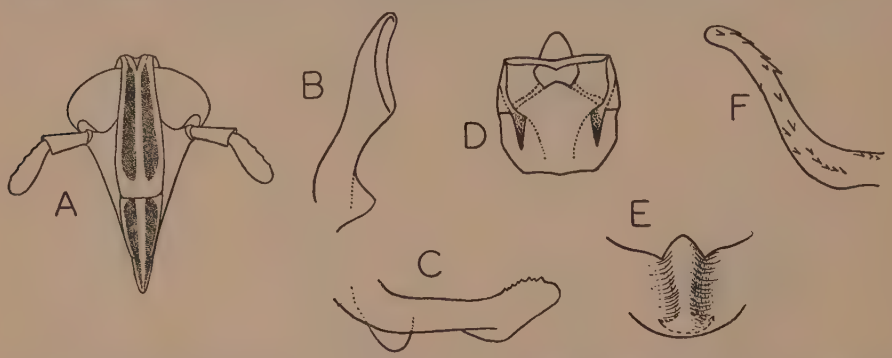

FIG. 4.—*Nesosydne calypso* sp. n. A, Frons and clypeus; B, left genital style, posterior view; C, left genital style, side view; D, anal segment of male, posterior view; E, armature of diaphragm; F, aedeagus right side.

Light form: Stramineous; base of frons, sides of head before eyes, a spot on pronotum behind eyes, tegulae dorsally, mesonotum laterally and metathoracic tergites fuscous; two impressions on vertex, one on each side of pronotal disc, and a suffusion along middle line of mesonotum testaceous-fuscous. Tegmina hyaline with faint yellowish suffusion, a suffusion along basal margin of clavus and an elongate spot at apex of clavus dark fuscous.

Dark form: As above, but with intercarinal areas of head and mesonotum, procoxae at base and thoracic pleurites, a suffusion over femora distally and tibiae except at apex, most of abdominal ventrites and genitalia fuscous. Tegmina hyaline with faint yellowish suffusion, basal margin of clavus, a spot at apex of clavus, venation except Cu1 and Cu2 at level of middle of corium, and distal transverse veinlets, fuscous piceous.

Anal segment of male with lateroapical angles rather widely separated, each produced ventrad in a stout spine. Pygofer in posterior view wider than deep dorsoventrally; diaphragm rather broad, produced dorsoventrally at middle into a broad ridge, which in side view projects caudad more strongly at its upper end, surface of diaphragm laterad of armature granulate; dorsal margin of diaphragm shallowly concave, but abruptly convex at middle. Aedeagus shallowly S-shaped, beset with about sixteen spines in a row from upper surface at apex down left side to near base, and about six spines along right side near ventral margin; orifice on left side, elongate-ovate and distinctly subterminal. Genital styles relatively narrow, in side view with a large triangular lobe near base on inner face directed ventromesad; apical part of style directed dorsocaudad; apical margin in posterior view weakly concave.

Male: Length, 3·6 mm.; tegmen, 3·1 mm.

Holotype ♂ and six males, JUAN FERNANDEZ: Mas-a-tierra; Cerro Alto 600 m., 1.ii.1952; Cerro Chumacera, 22.ii.1951; Miradero, 550 m. 15.ii.1951; Picacho Central, 600 m., 4.ii.1952; (one male) Mas-a-fuera; Inocentes Bajos,

1000 m., 27.i.1952. One specimen labelled merely "1" (*F. G. Kuschel*). Holotype male from Cerro Alto.

Nesosydne philoctetes sp. n. (Fig. 5, A–D)

Antennae with second segment 1·9 times as long as first, 2·4 times as long as wide; basal segment 4·0 times as long as broad. Rostrum attaining post-trochanters, apical segment only a little shorter than subapical.

Tegmina slightly surpassing abdomen; wings absent. Post-tibiae laterally two-spined, apically five-spined, basal metatarsal segment six-toothed, second segment four-toothed, calcar nine-toothed.

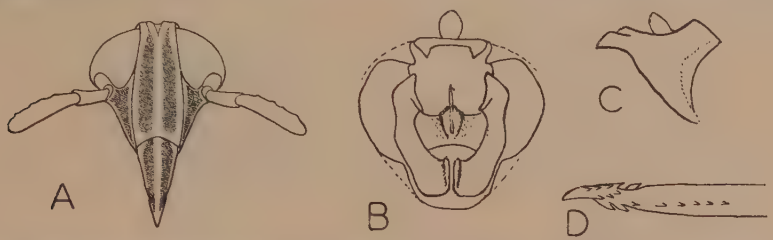

FIG. 5.—*Nesosydne philoctetes* sp.n. A, Frons and clypeus; B, pygofer and genital styles, posterior view; C, anal segment of male, right side; D, aedeagus, right side.

Stramineous; intercarinal areas of head, pronotum outside disc except broadly along hind margin, mesonotum laterally, thoracic pleurites, abdominal tergites and ventrites and pygofer in basal half fuscous to fuscous-piceous; intercarinal areas of pronotal and mesonotal disc, protarsi and a suffusion along meso- and postfemora testaceous-fuscous.

Tegmina hyaline; costal cell at base and apex, clavus at inner angle and at apex, and vein M at apex fuscous.

Anal segment of male with lateroapical angles each produced ventrad in a very short broad spine.

Pygofer in posterior view broader than deep dorsoventrally, dorsolateral angles slightly produced and directed mesad; diaphragm moderately deep, dorsal margin broadly convex, ventral margin concave, surface granulate sublaterally, armature comprising a median ridge and a line of granules on each side, these lines straight, converging ventrad.

Aedeagus ascending distad, directed caudad at apex and deflexed at tip, a row of three coarse teeth followed by a row of four dorsally near apex, a row of eight teeth dorsally on left, and a row of five ventrally on left, and a slightly interrupted oblique row of eight teeth laterally and subventrally on right side; orifice subterminal. Genital styles relatively long, in posterior view with inner margin strongly callussed at base, strongly concave in basal two-thirds, then produced in a slight eminence, then more weakly concave; outer margin sinuately convex, indented a little below apex, apical margin obliquely truncate, apical angle subspinose.

Male: Length, 3·2 mm.; tegmen, (brachypterous) 3·2 mm.

Holotype ♂ and two males and three females, JUAN FERNANDEZ: Mas-a-tierra; P. del Yunque, 200 m., 9.ii.1952, B. Cumberland, 1.i.1952 (*F. G. Kuschel*). Three of these specimens are labelled merely "9". One female from Mas-a-fuera; La Correspondencia, 1300 m., 20.i.1952 (*F. G. Kuschel*). Holotype male from P. del Yunque.

Nesosydne vulcan sp. n. (Fig. 6, A–G)

Antennae with second segment longer than first (2 : 1), first segment longer than broad (2·1 : 1) second longer than broad (3·6 : 1). Frontal carina simple to apical margin

of vertex, sides of frons rather strongly arcuate. Rostrum attaining post-trochanters, and lying between them, apical segment about half as long as subapical.

Pronotum with lateral margin at least as long as eye in same line, distinctly foliate. Tegmina sometimes reaching to apex of abdomen, sometimes just covering base, Sc + R forked near middle of tegmen, M simple, Cu1 forked level with junction of common claval vein and margin. Wings absent. Post-tibiae laterally two-spined, apically five-spined; calcar seven-toothed, occasionally eight-toothed; basal metatarsal segment with six teeth, second metatarsal segment with four teeth.

Testaceous; frons brown, with a characteristic pattern of five small round spots along upper portion of each lateral margin, and four transverse bars, two in the basal half of the disc and two others, more closely approximated, just distad of middle, median carina and

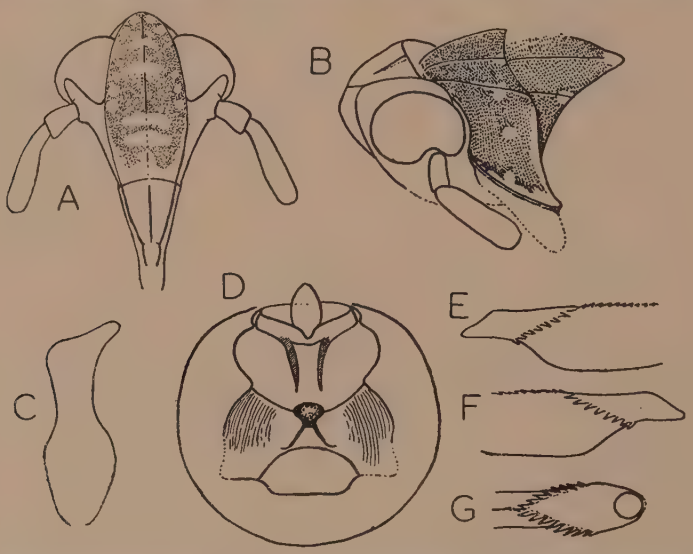

FIG. 6.—*Nesosydne vulcan* sp. n. A, Frons and clypeus; B, vertex, pronotum and left side of mesonotum, laterodorsal view; C, left genital style, posterior view; D, anal segment and pygofer, posterior view; E, aedeagus, right side; F, aedeagus, left side; G, aedeagus, dorsal view of apical part.

lateral margins distally, pale yellow; clypeus, vertex, antennae in part, pronotum except for three confluent spots overlying lateral carinae of disc, a round spot in middle of each sublateral field, and three spots along each lateral margin, and mesonotum except for a spot at base of each lateral discal carina and over mesoscutellum, dark castaneous; the aforementioned spots pale yellow. Pleurites, femora and tibiae at base and apex, tarsi, except distally, and lateral margins and areas of tergites of abdomen, suffused yellowish-brown. Tegmina hyaline with dull yellow suffusion, veins and a suffusion at node, brown; a spot just basad of Sc + R fork, another just basad of Cu1 fork, and two linear marks along sutural margin pallid, ivory-yellow; two linear marks on sutural margin fuscous-piceous.

Anal segment of male narrowly ring-like with lateroapical angles each produced ventrad in a moderately long spinose process, directed ventrad. Pygofer in posterior view about as wide as deep, laterodorsal angles not produced; diaphragm deep at sides, narrowing to middle, dorsal and ventral margins concave; armature knob-like, heavily pigmented, strongly projecting caudad with a pigmented ridge extending ventro-laterad from each lower angle. Aedeagus short, porrect caudad, in profile stout, rather abruptly narrowed in apical third, an oblique collar comprising about eight teeth on each side at base of con-

stricted portion ascending obliquely basad, and uniting dorsally, whence a row of minute teeth continues basad along middle line ; orifice round, terminal, facing dorso-caudad. Genital styles of moderate length, broadest at base, slightly constricted near middle, apical margin strongly oblique, outer apical angle subrectangulately or obtusely rounded, inner apical angle subacutely produced, rounded at tip.

Male : Length, 4·7 mm. ; tegmen, 3·9 mm.

Female : Length, 5·0 mm. ; tegmen, 4·1 mm.

Holotype male and a female from JUAN FERNANDEZ ; Mas-a-tierra ; Alto Francés, 450 m. 7.iii.1951 (type locality) ; Cerro Alto, 600 m., 1.ii.1952. An additional female, labelled merely " 6 ', probably was taken in Mas-a-tierra (*F. G. Kuschel*). This species is immediately recognisable by the long foliate lateral margins of the pronotum and the pattern of pale markings on the frons.

Delphacodes Fieber.

Fieber, 1866, *Verh. zool.-bot. Ges. Wien* **16** : 524. Logotype, *Delphacodes mulsanti* Fieber, *ibid.* : 526 ; designated by Kirkaldy, 1904, *Entomologist* **37** : 177.

Delphacodes kuscheli sp. n. (Fig. 7, A–D)

Post-tibial spur with about twenty minute teeth along margin.

Fuscous-piceous ; carinae of frons, clypeus, frontoclypeal suture, vertex and pronotum, lateral fields of pronotum, and tegulae, basal segment of rostrum, procoxae distally, pro- and mesotrochanters, four stripes along pro- and mesofemora, postfemora at apex,

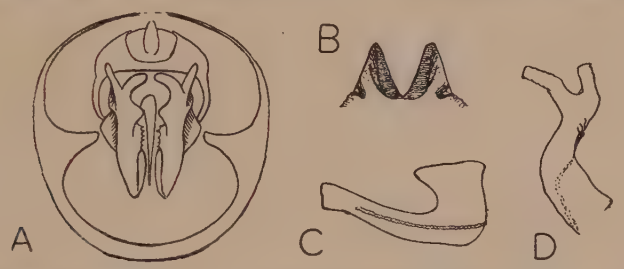

FIG. 7.—*Delphacodes kuscheli* sp. n. A, Male genitalia, posterior view ; B, median portion of diaphragm ; C, aedeagus, right side ; D, right genital style, side view.

post-tibiae and post-tarsi, pallid ivory-white ; antennae stramineous, carinae of mesonotum castaneous. Tegmina translucent, infumed, a linear mark on margin at apex of clavus and veins fuscous-piceous, tegminal margin, except for aforementioned mark, greyish white.

Anal segment of male about as long as broad, lateroapical angles each produced ventrad in a moderately long slender spine, incurved throughout its length. Pygofer in posterior view almost circular, diaphragm narrow at sides, dorsal margin on each side of middle very strongly produced dorsad in a smooth triangular lobe, each lobe higher than its basal width, and subacutely rounded at apex. Aedeagus short, abruptly bent near base, its distal portion tubular, porrect, of almost equal width throughout but narrowest one-third from apex, devoid of ornamentation except for a straight beaded ridge or thickening traversing each side almost throughout length ; orifice terminal. Genital styles moderately long and thick, strongly S-shaped, with lateroapical angles strongly and unequally produced, each truncate distally.

Male (brachypterous) : Length, 2·8 mm.

One male, the holotype, JUAN FERNANDEZ: Mas-a-tierra; B. Cumberland, 4.iii.1951 (*F. G. Kuschel*), B.M. 1954–57. This species is dedicated to its collector, Fr. Kuschel.

Delphacodes selkirki Muir. (Fig. 8, A–C)

Sogata selkirki Muir, 1924, *in* Bergroth, *Nat. Hist. Juan Fernandez* **3** (Zool.) : 401.

Fuscous; carinae and margins of head, about four transverse bands across median portion of frontal disc, pronotum, mesonotum, antennae, rostrum except at apex, femora except marginally, tibia at base and apex, lateral spines of post-tibiae, calcar and tarsi (except at base), testaceous. Brachypterous tegmina hyaline, a suffusion at base brown, a spot at middle of apical margin and another at apex of clavus, and a suffusion across intervening cells between these spots fuscous; apical margin distad of this suffusion pallid yellow.

Post-tibiae with two spines laterally, five at apex, basal metatarsal segment seven-spined; second segment four-spined; calcar with twenty-three even minute teeth along edge.

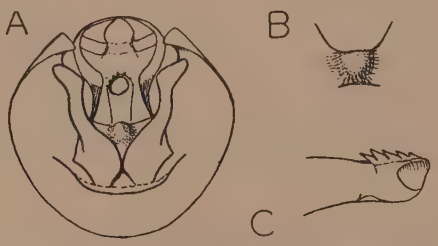

FIG. 8.—*Delphacodes selkirki* Muir. A, Male genitalia, posterior view; B, armature of diaphragm; C, apex of aedeagus, left side.

Anal segment of male short, ring-like, lateroapical angles each produced ventrad in a long, moderately stout spine, bent ventrad, then ventrolaterad and finally curved ventromesad at apex. Pygofer in posterior view about as broad as deep, laterodorsal angles strongly produced and incurved; diaphragm broad at sides, narrow medially; surface hollowed out submedially, armature smooth, projecting caudad in a knob-like boss. Aedeagus short and broad, narrowed distad with dorsal margin straight, ventral margin sinuate; orifice terminal, deeper on left side, upper rim a little projecting and surmounted by an incomplete crown of eight or nine teeth. Genital styles moderately elongate, broad at base, sinuately tapering to near apex, where they are a little expanded and obliquely truncate.

Male: Length, 3·1 mm.

Female: Length, 3·0 mm.

Two brachypterous males and eleven brachypterous females, JUAN FERNANDEZ: Mas-a-tierra; 200 m., P. del Yunque, 9.ii.1952, B.M. 1954–57; Miradero, 300 m., 10,13.iii.1951; B. Cumberland, 4.i.1952; two specimens bearing only the labels "5" and "9" respectively (*F. G. Kuschel*).

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THE MEGAPODAGRIIDAE AND AMPHIPTERYGIDAE (ODONATA) OF THE AFRICAN CONTINENT.

By Lt.-Col. F. C. Fraser, I.M.S., Retd., F.R.E.S.

Species belonging to the families Megapodagriidae and Amphipterygidae have a wide and extremely broken distribution and must be regarded as archaic remnants of a once world-wide circumtropical fauna. Present day species are to be found in the neotropics of Central and South America and the tropics of S.E. Asia, Papua, Australia and Madagascar ; fossil species have been described from the Eocene and Miocene of North America.

The African continent is singularly poor in species of both families, only two belonging to the Megapodagriidae and a single species to the Amphipterygidae being known ; this paucity compares strikingly with the fauna of the neighbouring island of Madagascar, from where not less than 22 species of Megapodagriidae have been reported. None of the three genera to which these species belong is represented in Africa, although *Neurolestes trinervis* Selys, one of the two African species, is closely related to them.

Recently all three African species of the Amphipterygidae and Megapodagriidae have been received by me. Mr. John Cowley has generously presented me with a male of *Neurolestes trinervis* and a female of *Pentaphlebia stahli* Förster, whilst Mr. Elliott Pinhey has given me a female of *Coryphagrion grandis* Morton ; the original type of this species, a female, has been presented by me to the British Museum. In addition to these specimens, a female of *Neurolestes trinervis* Selys in the collections of the Centre Faunistique, Paris, has been sent to me for study and Mr. Jorgen Dahl, of the Copenhagen University Museum, has sent me specimens of the nymph of *Pentaphlebia stahli* Förster, which he collected in the Cameroons, West Africa, and which had fortunately retained all details of the venation of the wings and so were easily identifiable.

I am especially indebted to Mr. John Cowley for the loan of photographs of the habitats and coloured figures of *Neurolestes trinervis* and *Pentaphlebia stahli*, as well as lengthy notes about the nature of the habitats and details of venation of specimens in his collection and for the generous gift of examples of each. As only a single male of *P. stahli* is known, the type in the Ann Arbor, Michigan University collection, I had to rely on Mrs. Leonora Gloyd for figures of the anal appendages which she very kindly executed for me. Little is known of the ecology of *Coryphagrion grandis*, but Mr. Elliot Pinhey of the Coryndon Museum, Nairobi, has given me notes on the habitats and flight of the species, as well as presenting me with a female specimen. To all these specialists I wish to express my deep appreciation and thanks for their co-operation without which this paper could not have been written.

Coryphagrion grandis Morton. (Fig. 1 and 5, *c*.).

Coryphagrion grandis Morton, 1924, *Entomologist* **57** : 218. (Type).
Kimmins, 1931, *Ann. Mag. nat. Hist.* (10) **7** : 215. (Allotype).

The type was said to have been taken in forest far from any water, several others having been seen but not captured. This would suggest that the breeding

places are of unusual character and, secondly, that the insect is difficult to capture. Mr. Pinhey has taken the species in the Kimboza forest, Morogoro, Tanga territory, x.51, and Mr. Van Someren in the Shimba Hills, North of Mombasa, iii.41. The former has sent me the following notes :—" *C. grandis* occurs near the coast on the Tanganyika-Kenya border and also near Morogoro in East-Central Tanganyika : always in rather dense forest ; flight slow but capable of sudden quick movement to dodge obstacles (or a net !) ; generally I have seen it perching on twigs or lianas at about 6–10 ft. in spots where the sun has penetrated ; but one or two females were fluttering close to the ground. At the *height* of the dry season they can be seen still on the wing although the only water available may be a mere trickling forest stream. There is *no* standing water in rock-holes ; vegetation is very dry and there are no Bromeliads, only certain palms and a few banana plants. It is just possible, I suppose, that the adults had survived 3 or 4 months and that the larvae could race through their cycle in a short time in the wet season—otherwise they would be dessicated ! These forests are not comparable to those of high rainfall as in West Africa, or Asia and America. Perhaps, after all, they breed in mud or in the streams ? There is no vegetation in the streams and I dredged up very few larvae, mostly Libellulines."

This suggests to me that *Coryphagrion* aestivates in the same way as species of *Lestes* in the Oriental region which, at the beginning of the monsoon rains, return to water, oviposit and pass through their complete life cycle in paddy fields in the short space of four months. The extremely long abdomen would be a cumbersome instrument for oviposition in mud and I see no reason why it should be developed to such great length for ovipositing in streams. The comparison with the neotropical Pseudostigmas is so close that I think there can be no doubt that a similar method of ovipositing is resorted to, viz. that of depositing the eggs in the bracts of plants or palms and this probably at the advent of the rains in the wet season. Heavy dews would keep these receptacles full for a period of six months and quite long enough for the insect to complete its nymphal life. I have measured the combined length of the male and female *in cop.*, which is 8·5 inches (217 mm.), which compares with that of *Mecistogaster lucretia* (Drury), the longest of the Amazonian Pseudostigmas, 9·5 inches (225 mm.). I regard the close similarity of these measurements as very significant.

Neurolestes trinervis Selys. (Figs. 2 and 4).

Neurolestes trinervis Selys, 1884, *C.R. Soc. ent. Belg.* **29** : cxliv. 1886, *Id.*, *Mem. Cour.* **38** : 71.
Kirby, 1890, *Cat. Odon.* : 124.
Karsch, 1896, *Ent. Nachr.* **22** : 21.
Martin, 1907, *Mem. Soc. esp. Hist. nat.* **23** : 428.
Munz, 1919, *Mem. Amer. ent. Soc.* **3** : pl. 10. 62.
Kennedy, 1920, *Ohio J. Sci.* **21** : 129, pl. 10.

Mr. Cowley has sent me details of venation of 4 males and a female, and I include in these those of a female in the Paris collection.

Antenodals 3 (4 in 2 hind wings) ; cubito-anals 3 to 5 in all wings, generally only 4, one or two of which may be proximal to the level of the antenodals ; postnodals 19 to 21 in fore wings, 17 to 19 in the hind ; origin of Riii from the 7th to 9th postnodals in fore

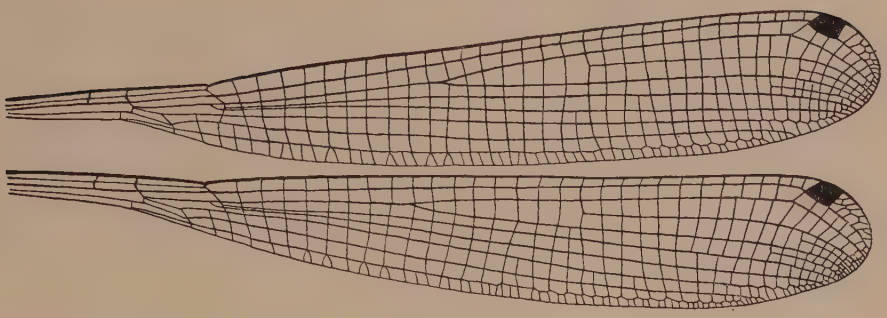


Fig. 1.

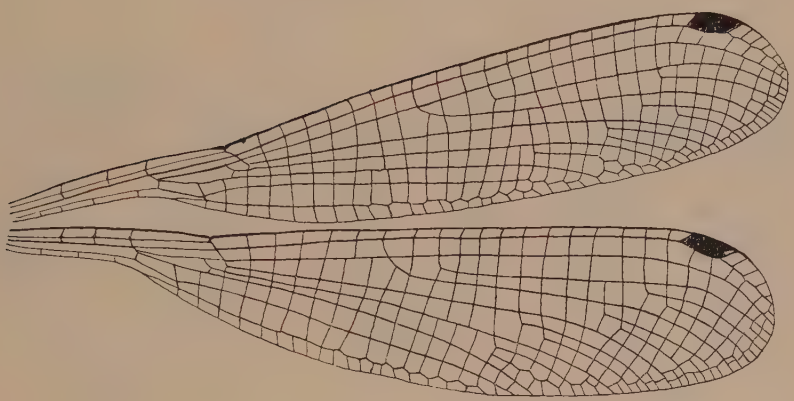


Fig. 2.

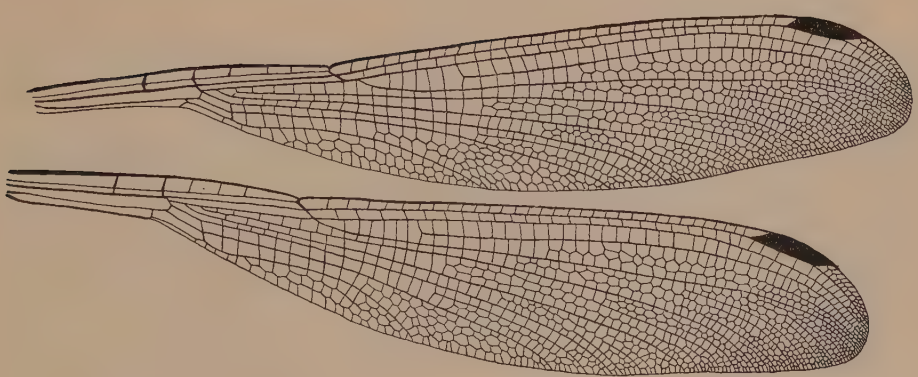


Fig. 3.

Figs. 1–3.—Wings of (1) *Coryphagrion grandis* Morton; (2) *Neurolestes trinervis* Selys; (3) *Pentaphlebia stahli* Förster.

wings, 6th to 7th in the hind; origin of IRii at level of 9th to 11th postnodals in fore wings, 8th to 10th in the hind. The pterostigma is unbraced and Rii not angulated distally, as is the usual formation in the Megapodagriidae. IRiii arises constantly at the subnodus and Riv+v one cell before; finally two intercalaries always present between the main longitudinal veins from IRiii to MA.

With regard to the colours in life, the collector, Monsieur R. Borelly, has sent a coloured sketch executed by his wife which shows that the pale colours on the face, coxae, and sides of segments 2 to 7 are yellow, pale greenish-yellow on the sides of thorax, whilst the transverse stripe on the vertex of head and the antehumeral stripes are brick-red. In the female, these colours are similar

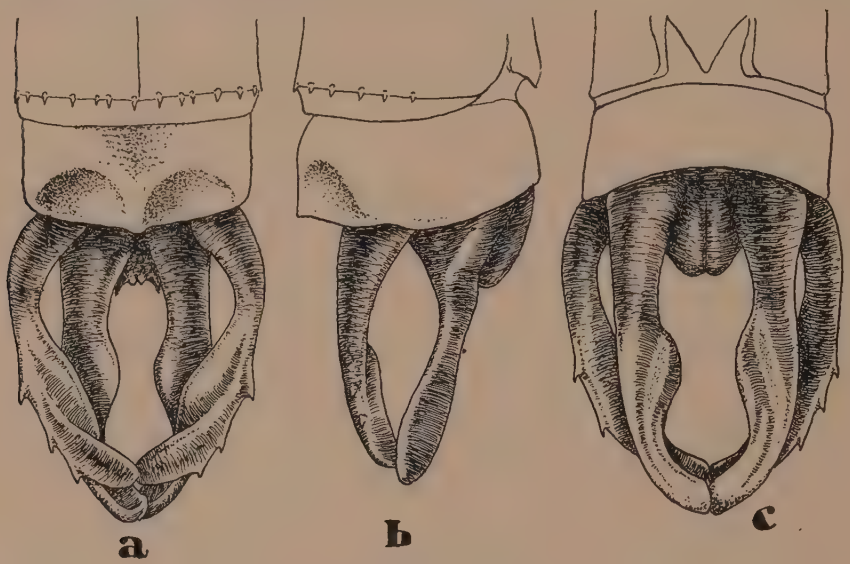


Fig. 4.—Male anal appendages of *Neurolestes trinervis*. (*a*) Dorsal view, (*b*) right lateral, (*c*) ventral.

except for the two latter, which are a beautiful olive-green. The dorsum of segment 9 is pale azure blue with a moderately broad apical black annule; in the female this segment appears to be greenish-yellow with the mid-dorsal carina finely black, but in old adults it probably changes to blue, as in the male. In the type, the antehumeral stripes are said to be broadly interrupted at the middle and upper thirds, but this is seen to be the case only in the female taken by Borelly, whilst the Paris female shows only a slight narrowing at this level. In the males examined these stripes are complete, although greatly and abruptly narrowed above (only on one side of one male is the stripe broken up into a lower stripe and an upper triangular spot).

Of this species M. R. Borelly says that it is very rare and taken in forest. The type came from Old Thal, Cameroons, and all other specimens have come from the same montane area; 1 male from N'Kingsamba, 900 m., xii.36; 1 female and 2 males from Dehane, ii–iii.37 and the Paris specimens from

Evodoula, xi.51. I have figured here, for the first time, the anal appendages and it will be seen that the Selysian description is not quite accurate ; thus the superiors are much more curved than the inferiors and bear three robust spines on their outer border ; the inferiors are nearly parallel and present a medial swelling on their inner border—the whole appendage is shaped like the strongly extended foot with the toes strongly flexed of a ballet danseuse, the medial swelling representing the heel.

The relationships of the above two species and their correct place in the Order are easy to assess in the case of *N. trinervis*, but equally difficult in that of *C. grandis*. *N. trinervis* is undoubtedly closely related to the Madagascan *Nesolestes*, except the triplicating of the antenodals (but this is probably an acquired speciality). It is of interest to note that the extra antenodal, the most proximal one, is of the same strength as the primaries. Of greater interest are the accessory cubito-anals, which suggest an increasing tendency for the origin of the anal vein to move nearer the base of the wing. The apices of the wings are more rounded than is usual and the hind wing is definitely broader than the fore.

Morton, in a careful analysis of the characters of *Coryphagrion*, suggested that it was nearest *Megapodagrion*. This may be so, judged by the characters listed by Calvert, but there are serious difficulties to accepting this placing. Thus, there are no long intercalaries which are a generic character for *Megapodagrion*, and indeed for the whole of the family ; the pterostigma is strongly braced and Rii is angulated at the meeting with that brace—both characters foreign to the Megapodagrions. The greater part of the venation lies closer to the Protoneuridae than to the Megapodagriidae, but the present anal vein excludes it from the former family. The shape of the wings, their venational characters and the extraordinarily long abdomen are identical to those of the Pseudostigmatinae, especially the genus *Mecistogaster*, and I have suggested a similar method of oviposition. The penis, figured by Kimmins, is extremely simple in structure but has a greatly hypertrophied internal fold (not shown by Kimmins) and, apart from this character, is closely similar to that of the Central American *Thaumatoneura inopinata* McLachlan (which is another problem species in the Odonata). Although I have here retained *Coryphagrion* in the Megapodagriidae, I believe it to be very doubtfully placed in the family.

Pentaphlebia stahli Förster. (Figs. 3 and 5, *a*).

Pentaphlebia stahli Förster, 1909, *Jb. nassau. Ver. Naturk.* **62** : 213.

No further descriptions of this rare species have been published since Förster first described it and no figures have been made of its venation or genitalia, which I am now able to supply. Two errors in Förster's description must first be pointed out. In the first line on p. 213 he gives the length of the abdomen as 23 mm., but in the second paragraph, as 42 mm. ; the latter is the correct measurement. On line 5 he states that there are 52 to 54 antenodals, but postnodals was obviously meant. Mr. Cowley has given me particulars of the venation of three females collected by Monsieur Borelly, as follows :

Two complete antenodals (the primaries) ; secondary (incomplete antenodals running from the costa to subcosta) 2 to 4 in the fore wings, 3, 3, 2 and 4 in the hind ; no accessory cubito-anals ; postnodals vary in fore wings from 39 to 47 and in the hind from 34 to 40 ;

IRiii takes origin nearest postnodal 5 to 9 in forewings and nearest the 5th to 7th in the hind ; 2 to 3 intercalaries between the anal vein and posterior border of wing ; 2 rows of cells between the costa and Ri distal to the pterostigma, increasing to 3 rows apically.

A coloured sketch of the living female by Madame Borelly, which accompanied the three females, shows some characters which were absent in Förster's specimens. The thorax shows some pale green markings as follows : Linear antehumeral stripes ; a posthumeral linear stripe incomplete in its lower half ; a broader stripe extending from between the wing roots to the middle coxae and lastly a narrow stripe on the anterior border of the metepimeron which is confluent below with the median stripe ; the ground colour between these

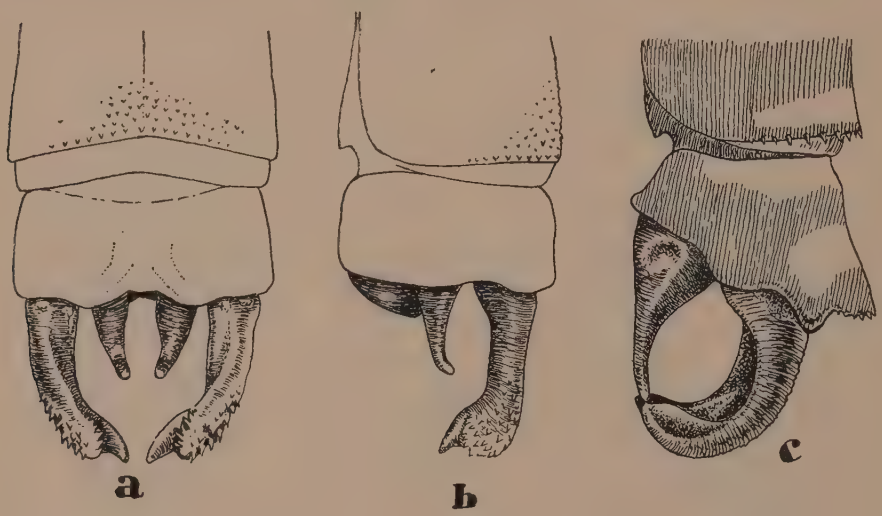


Fig. 5.—Male anal appendages of (*a*) *Pentaphlebia stahli* ; (*b*) the same, left lateral aspect ; (*c*) *Coryphagrion grandis*, left lateral aspect.

stripes is a dark chocolate-brown. The abdomen is pale yellow below, reddish or ferruginous on the sides and dull reddish on the dorsum, deepening to dark reddish-brown at the apical ends of the segments and finally to black at the intersegmental nodes. Segment 9 is azure blue for almost its apical half (but green in the female Mr. Cowley has presented to me, probably from *post-mortem* decomposition). The presence of this blue annule in the female makes it certain that segment 9 is partly and probably entirely blue in the male, although this is not mentioned by Förster. Förster also does not mention the fact that the superior anal appendages are coated on the outer side of the apex with numerous spines, which are most robust on the border of the sulcus separating the apex from the inner beak-like spine (fig. 5, *a*, *b*).

In a small collection of Odonate nymphs sent to me for study by Mr. Jorgen Dahl, of the Copenhagen University Museum, I have seen nymphs of at least two instars belonging to *P. stahli*, the identification being made from the venation of the wingpads in which every vein was clearly visible, so much so that even the minute double row of cells following the pterostigma could be seen with clarity. This nymph is comparable with the bizarre *Rimanella arcana* (Need-

ham) and the two may be considered as the most remarkable forms so far found in the Order. Its description follows :

Total length 23 mm. Body 18 mm. Appendages 5 mm. (Fig. 6.)

Head pentagonal, eyes globular, bordered anteriorly and externally along the lower border by a narrow plaque which is fringed with closely-set, short vibrissae ; similar vibrissae border the labrum anteriorly to form an almost continuous fringe across the front of the head ; antennae 6-segmented, the penultimate basal segment greatly enlarged and compressed and again fringed, as in the case of the eyes and labrum, thus completing the continuity of the fringe. Three dark spots on the mid-line of head, a small quadri-

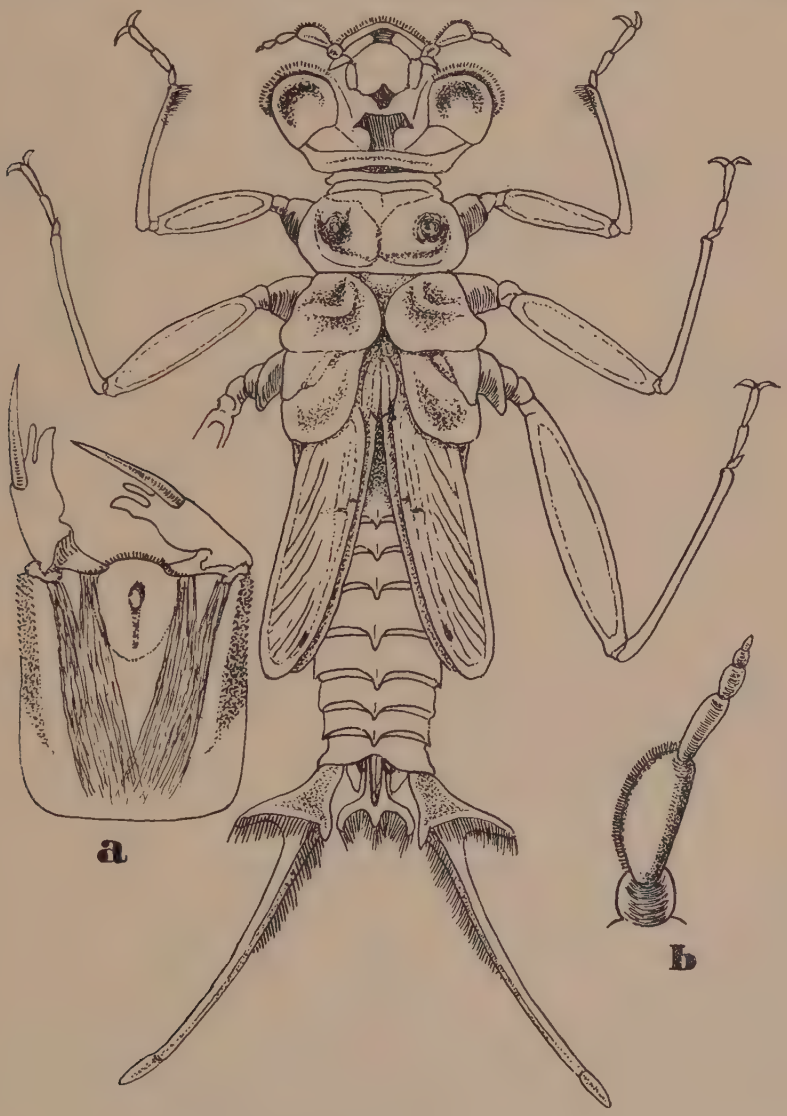


Fig. 6.—Nymph of *Pentaphlebia stahli*. (*a*) Labrum, (*b*) antenna.

lateral spot on the epistome, an arrow-head-shaped spot on the vertex and a much larger T-shaped spot on the occiput. Prothorax and thorax massive and irregularly ridged and furrowed, the former bearing a large conical obtuse spine on each side of dorsum. Wing-pads large, extending to the sixth segment of abdomen (but the latter may have shrunken in which case they would extend only to the fifth), venation in wings very clearly defined so that the number of postnodals can be counted and the pterostigma clearly seen. *Legs* rather long, splayed out from the body and markedly flattened, the femora especially, which are dilated fusiformly and deeply and widely hollowed on the upper surface ; no armature or setae visible (but may have been shed) ; tibiae slim, the anterior ones having a distal cleansing-comb. *Abdomen* short and stout (so short as to be quite disproportionate to the rest of the body, so that it is possible the specimen has shrunken and telescoped from long immersion in alcohol ?). Each segment, except the two basal and the apical, bearing a robust mid-dorsal spine which overlaps on to the following segment ; lateral spines absent. Caudal appendages much like those of *Rimanella arcana* Needham, the lateral ones triquetral, prolonged as long tapering spines but with the base expanded trumpet-shaped with a robust spine on the inner side and obtusely pointed on the outer, the posterior border thickly fringed with long hairs, which extend also for some distance along the shaft of the appendage on its inner side. (When first examined these hairs had agglutinated so as to resemble stout spines for which they were at first mistaken.) A distinct node visible at the apical end of shaft. Medial or dorsal appendage greatly abbreviated, so that it appears as if the nymph has only two appendages, as in *Chlorocypha* nymphs ; shortly stalked, then expanded into a trident, the lower and external arms of which are slightly the longer and directed downwards ; the medial, shorter arm directed straight to the rear and all fringed with long thickly-set hairs. The medial appendage, viewed from behind, is seen to form an equilateral triangle with the apical spines at the angles. Labial mask broadly rectangular, Gomphine-shaped, the medial fissure closed and vestigial and visible only by its greater translucency. Body of the labium slightly longer than broad, its sides beset with a long field of tiny close-set spines ; midlobe convex, short, projecting but slightly and fringed with short closely-set teeth. Lateral lobes without setae but with long movable hook and two elongated teeth at the apex, the inner the more robust, claw-shaped, the outer ungulate.

This nymph bears a close resemblance to that of *Rimanella*, but the latter has the external appendages longer and finer and differs in many other characters. It is best compared with the nymphs of *Diphlebia* and *Philoganga*, which it resembles by its stunted size, large head and flattened limbs. In these nymphs the curious orbital ridges are also present, but the fringe of hairs is replaced by a row of spines. The caudal appendages are entirely different and it is evident that specialisation of the nymph has advanced far beyond that of the imago. The venation of *Pentaphlebia stahli* is remarkably similar to that of *Diphlebia*, but is of a closer reticulation. It is of a slimmer build, its thorax being of only half the bulk of *Diphlebia*, its head narrow and more Coenagrine in shape, whereas that of *Diphlebia* is broader, more compact and distinctly Gomphine-shaped. The face is naked in *P. stahli* but very hairy in *Diphlebia*. Nevertheless, there can be no doubt of the close relationship existing between the two genera, nor of its place in the family Amphipterygidae. The extremely depressed shape of the nymph indicates that it lies flush on stones or rocks in rapid swirling waters and the formation of the caudal appendages are clearly designed as anchoring devices to prevent its being swept away by the strong current. One can only conjecture as to the purpose served by the anterior fringe on the head ; the hairs may be tactile or they may assist the nymph to hold its ground in the strong current by capillary suction.

SOME NEW HIMALAYAN CURCULIONIDAE (COLEOPTERA).

By Sir Guy A. K. Marshall, K.C.M.G., D.Sc., F.R.S., F.R.E.S.

The types of the five new species described below are all in the collection of the British Museum (Natural History).

Subfamily Brachyderinae.

Leptomias undulans sp. n.

♂♀. Derm dull black, with fairly dense grey scales; when partly abraded the scales are denser in the punctures on the elytra, giving a mottled appearance.

Head with very fine dense punctures that are more or less longitudinally confluent, and with a short median stria continuous with that on the rostrum; eyes strongly convex. *Rostrum* longer than broad (4 : 3), almost parallel-sided, but very slightly sinuate laterally; dorsal area broad, nearly flat, with irregular variable longitudinal striolae and a deep median sulcus. *Antennae* black, the scape hardly reaching the middle of the eye; funicle with segment 1 longer than 2, the distal segments longer than broad. *Prothorax* as long as broad or slightly transverse, somewhat rounded laterally, widest a little behind the middle, shallowly constricted at the apex, which is narrower than the base; the dorsum coriaceous, with a fine indistinct median stria and some small variable impressions, becoming rugulose on the pleurae; no setae. *Scutellum* distinct. *Elytra* much wider than the prothorax in both sexes, narrowly elliptical in male with the apices separately rounded, somewhat wider in female with the apices forming a densely setose short obtuse process; the shallow striae with the widely spaced punctures each contained in a rounded depression, giving an undulating effect to the whole surface; the intervals only slightly wider than the punctures and also undulant, all of equal height and without setae, except along the lateral and apical margins where the setae are rather dense, short and suberect. *Legs* rather long and slender, black, with grey scales; the front tibiae somewhat incurved at the apex and strongly denticulate beneath in both sexes, the denticulations smaller on the posterior pairs.

Length 9–11 mm.

S.E. Tibet: Zayul, Atakang, 8000 ft., 1♂, 1♀, vi.1933 (*F. Kingdon Ward* and *R. J. H. Kaulback*—type); Zayal, Mudung, 7500 ft., 1♀, v.1933; Rong Tö Valley, 6500–7000 ft., 1 ♂, 2 ♀, v.1933; Lohit Valley, 1000–3000 ft., 2 ♂, iii.1933 (*F. K. W.* and *R. J. H. K.*).

A very distinct species on account of the unusual undulating surface of the elytra.

Leptomias clavicrus sp.n.

♂♀. Dull black, with fuscous scaling having a slight bronze reflection and with scattered grey scales, which are more numerous along the suture and at the apex; the scales appear to be very easily abraded, especially on the head and pronotum; underside with dense grey scales, the metasternum and two basal ventrites with dense subrecumbent silvery hairs in male, which are greatly reduced in female.

Head with numerous small separated punctures, the frons transversely convex, without any median stria; eyes moderately convex. *Rostrum* longer than its apical width (8 : 6) in male, slightly shorter in female, almost parallel-sided, not widened at the genae; dorsal area broad, flat or very shallowly depressed in the middle, with punctures somewhat stronger than those on the head and sometimes more or less confluent, with a deep median

stria, the lateral margins rounded off. *Antennae* black, rather stout, the scape reaching the middle of the eye; funicle with segment 1 as long as 2+3, 2 much longer than 3, 3 longer than 4, 4–7 subequal, about as long as broad. *Prothorax* nearly as long as broad, strongly rounded laterally, widest at or a little behind the middle, narrowly constricted at the apex, which is somewhat narrower than the base; the dorsum moderately convex longitudinally, with fine close shallow punctures, normally concealed by scales, without any trace of a median stria. *Scutellum* distinct, but very small. *Elytra* broadly ovate,

Fig. 1. *Leptomias clavicrus* sp.n. Male

almost similar in the two sexes, widest at the middle, constricted at the base so that the carinate basal margin projects laterally, the apices jointly rounded, but the apical area rather more produced and narrower in female; the impressed striae with small deep close punctures that are visible through the scaling; the intervals somewhat convex, of equal height, without setae on the basal part of the disk, but with numerous (3 or 4 abreast on each interval) short suberect whitish setae towards the sides and apex. *Legs* black, with rather dense fuscous scales and sparse isolated white ones; front tibiae not incurved at the apex but broadly and roundly dilated at the external apical angle.

Length 11–12 mm.

S.E. TIBET: Tsangpo Valley, Tsela Dzong, 9600 ft., 1 ♀, vi.1924; 10,000 ft., 3 ♂, 4 ♀, vii.1935 (*F. Kingdon Ward*).

This comparatively large species can be distinguished from the numerous

forms previously described by the external apical projection on the straight front tibiae ; the dense hairs on the two basal ventrites of the male are very unusual.

Leptomias kingdonwardi sp.n.

♂♀. Derm dull black ; head, rostrum and pronotum bare (possibly with sparse green scales) ; elytra with small round green scales in the large punctures, but the apical area with dense grey or fulvescent scales ; underside with dense grey scales laterally and short erect grey setae in the middle.

Fig. 2. *Leptomias kingdonwardi* sp.n. Male

Head with very fine dense punctures throughout that are never confluent, the frons without any median stria or fovea ; eyes moderately convex. *Rostrum* longer than broad (4 : 3), very stout, parallel-sided except for a shallow sinuation behind the antennae ; the dorsal area broad, nearly flat, with punctures like those on the head and a small fovea in the middle of the base, without any median stria (♂) or with a shallow one (♀), and on each side a very shallow short sublateral longitudinal impression. *Antennae* black, the scape nearly reaching the middle of the eye ; funicle with segment 1 as long as 2+3, the distal segments slightly longer than broad. *Prothorax* as long as broad (♂) or a little broader (♀), gently rounded laterally, widest at the middle, shallowly constricted at the

apex, the constriction extending faintly across the disk, the base a little wider than the apex; dorsum flat longitudinally, punctured exactly like the head, with a short median stria at the base only, the pleurae very coarsely wrinkled transversely. *Elytra* wider than the prothorax in both sexes, narrowly elliptical in male, somewhat wider in female, widest rather behind the middle, the apices separately round in male, but forming a very short obtuse setose projection in female, the basal angles shortly projecting obliquely; the dorsum with the transverse convexity much lower than usual, with rows of partly irregular large foveolae that are broader than the irregular intervals; the septa between the foveolae as broad as and frequently higher than the intervals, often joining up laterally to form broad irregular transverse wrinkles; the disk without setae, but the lateral and apical areas with very short dense erect pale setae, the small round scales confined principally to the hollows. *Legs* red-brown, with the tarsi blackish, with rather sparse subrecumbent pale setae.

Length 13–15 mm.

S.E. TIBET: Po Tsangpo, above Gompo Ne, 6000 ft., 2 ♂, 1 ♀, xii.1924 (*F. Kingdon Ward*).

This unusually large species has a very different facies from its typical Indian congeners, but seems to present no satisfactory generic differences. Its large size and foveolate green-scaled elytra distinguish it from all the previously described species.

Leptomias aeneus sp.n.

♂♀. Derm black, the upper surface clothed throughout with dense small round coppery scales, usually with elongate dark spots along the striae; underside with dense elongate fringed grey scales on the sternum, mixed with a few round coppery scales, the venter with round scales and a basal band of fringed scales on each ventrite.

Head with the fine close shallow punctures entirely concealed by scales, the frons transversely convex, without any median stria or puncture; eyes only slightly convex. *Rostrum* a little longer than broad, gradually widening from near the base to the genae; the dorsal area broad, smooth and slightly convex transversely, with a deep median sulcus but without lateral impressions. *Antennae* black, the scape not reaching the middle of the eye; funicle with segment 1 nearly as long as 2+3, 3, 4 and 7 subequal, 5 and 6 shorter. *Prothorax* transverse (5 : 6), strongly rounded laterally in male and widest at about the middle, less rounded in female and widest behind the middle, narrowly constricted at the apex, the constriction not or very feebly continued across the disk, the base wider than the apex; dorsum with very dense minute punctures that are covered by the scales and very fine median stria that is usually confined to the basal half and sometimes obsolete. *Elytra* of male narrowly elliptical, but somewhat wider than the prothorax (5 : 4) and obtusely rounded behind, those of female much broader and more acuminate behind; the basal angles projecting shortly, the narrow shallow striae showing through the dense scales, but the very small punctures mostly obscured; the intervals broad, smooth and nearly flat, without setae on the disk, but with numerous short erect setae on the apical declivity of interval 1 only. *Legs* black, with dense grey or coppery scales; front tibiae incurved at the apex, the external apical angle somewhat roundly produced, strongly denticulate beneath, the posterior pairs with smaller teeth.

Length 9–12 mm.

TIBET: Gyangtse, 13000 ft., 10 ♂, 14 ♀, vi.1904 (*H. J. Walton*).

Nearly allied to *L. waltoni* Mshl. (1916), which occurs in the same area, but is smaller (6–8 mm.) with deeply impressed and much more coarsely punctate striae and convex intervals; the tibiae are not denticulate; and the hind margin of the eyes is raised slightly above the level of the temples. The coppery colouring is unusual in the genus.

Subfamily EREMNINAE.

Lagenolobus borupi sp.n.

♂. Derm piceous, thinly clothed with very short fine recumbent setae.

Head with coarse, longitudinally confluent punctures; eyes moderately convex, small, surrounded by a sulcus. *Rostrum* as long as its apical width but a little shorter than its width at the base, narrowing rapidly from the base to the antennae and widening again to the apex; the dorsal area flat, more or less carinulate, with a deep median sulcus on the basal half; the lateral areas not sulcate. *Antennae* with segment 1 of the funicle

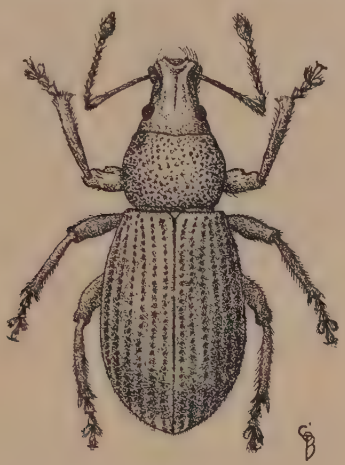


FIG. 3. *Lagenolobus borupi* sp.n. Male

longer than 2, 6 and 7 subglobular. *Prothorax* transverse (8 : 11), moderately rounded laterally, widest at or a little beyond the middle, of equal width at base and apex, which are both truncate, the postocular lobes obsolete; dorsum flat longitudinally, with coarse close, but not confluent, punctures, and minute recumbent setae. *Elytra* obovate, widest far behind the middle, jointly truncate at the base, broadly rounded behind, the shallow striae with strong close punctures that hardly diminish behind; the broad intervals slightly convex, finely aciculate, with sparse fine recumbent pubescence and with a row of very short suberect setae on the posterior declivity. *Legs* piceous, with fine sparse recumbent setae; femora with a very small tooth, front tibiae not sinuate below.

Length 4·0–4·1 mm., breadth 1·7–1·8 mm.

CENTRAL HIMALAYA: Tehri Garhwal, Rudugira Gael, 15,000 ft., 2 ♂, in alpine meadow and under stone, 1952 (*H. F. Lamprey*).

The nearest ally is *L. adspersus* Fst. (1897) from Chamba and Dalhousie, in which the rostrum is rather longer and narrower; the eyes are larger and almost flat; the distal segments of the antennae are much longer than broad; the prothorax is very rugosely punctate and has appreciable postocular lobes; and the elytra are ovate, with longer erect setae.

I have been asked to dedicate this species to the memory of Mr. Paul Borup, of Copenhagen University, who was a member of the Oxford University Expedition to Tehri-Garhwal, in the Central Himalayas, in 1952 and who died at Uttarkashi on the 15th October, 1952, as a result of an accident.

Book Notices.

Diseases of Fruits and Hops. By H. Wormald, D.Sc., A.R.C.S., D.I.C. London (Lockwood), 3rd ed. 1955. Pp. 325, pls. text illust. Price 25s.

This is a new and entirely revised edition of a work which first appeared in 1939, and is intended mainly for the practical grower.

The subject matter is arranged to facilitate the ready recognition of symptoms; the diseases are grouped under host-plants and then under the various organs on which the symptoms are to be seen, beginning with the roots. Though recognition is the primary aim, information is included about the nature of the parasites to enable the grower to understand the measures advocated for the control and cure of diseases.

Much important information has been added in the new edition, particularly with regard to virus diseases of hardy fruits.

The volume is very fully illustrated and there is an index to popular names and control measures as well as a separate index to scientific names.

Mosquitoes: Their Bionomics and Relation to Disease. By William R. Horsfall. Large 8vo. New York (The Ronald Press Co.). 1955. Pp. viii + 723. Price $16.00.

This work, which is by the Associate Professor of Entomology in the University of Illinois, is the result of nearly twenty years research and summarises the extensive literature on the bionomics of the mosquito in a form which makes it accessible for easy reference.

The material is arranged according to accepted taxonomic classifications. General information on the subfamily as a whole and on each genus precedes the more detailed treatment of individual species.

Full information on control methods in use to-day is included, so that the work is of practical value to all concerned with the control of mosquitoes.

The author in his preface expresses the hope that it will provide a starting point for new research.

A very comprehensive 79-page bibliography and an index complete the work.

The Physiology of Insect Metamorphosis. By Vincent Brian Wigglesworth, C.B.E., M.D., F.R.S. (Cambridge Monographs in Experimental Biology, 1.) 8vo. Cambridge (Cambridge University Press). 1954. Pp. 152, pls., text illust. Price 12s. 6d.

This is the first of a series of " authoritative, quick-publication 40,000-word monographs " to be published by the Cambridge University Press.

The introductory chapter deals with the historical aspects and early theories of metamorphosis. Then follow chapters on the histological changes during moulting and metamorphosis; the physiology of growth and moulting; the physiology of metamorphosis and on differentiation and polymorphism.

A very comprehensive bibliography, running to some 400 titles, and an index complete the work.

NOTES ON THE *NACADUBA HERMUS* (C. FELDER) COMPLEX (LEPIDOPTERA: LYCAENIDAE).

By Lt.-Col. J. N. Eliot, R.A., F.R.E.S.

The genus *Nacaduba* Moore comprises a large number of puzzlingly similar species, and it is not surprising that the older authors failed in many cases to establish the correct specific relationships of the many geographical races. So far as the Indo-Malaysian species are concerned, Corbet (1938, *Trans. R. ent. Soc. Lond.* **87** : 125–146 ; 1948, *Proc. R. ent. Soc. Lond.* (B) **17** : 98–101) largely reduced confusion to order. However, his treatment of the *pavana* group contained errors. In particular he failed to distinguish between two species which must be known in future as *N. subperusia* (Snellen, 1896) and *N. sanaya* Fruhstorfer, 1916, whilst he confused females of the former with females of *N. pavana* (Horsfield, 1828) and *N. hermus* (C. Felder, 1860).

Key to the Indo-Malaysian species of the *pavana* group of *Nacaduba* Moore.

1 (2) Underside hindwing with a prominent, rounded black spot at the apex . . . . . **angusta** (Druce, 1873)

2 (1) Underside hindwing without such a spot.

3 (4) Underside: spaces between the paired discal striae filled in by two rather narrow lines darker than the ground colour, with between them a much broader line lighter than the ground colour . . . . . **pavana** (Horsfield, 1828)

4 (3) Underside: spaces between the paired discal striae concolorous with the ground colour.

5 (6) Underside: striae yellowish, broad and the inner submarginal series diffuse . . . . . **pactolus** (C. Felder, 1860)

6 (5) Underside: striae narrow (except in *sanaya* from Celebes, the Philippines and Moluccas, which have broad chalk-white striae).

7 (10) Underside hindwing: distance between inner submarginal and outer postdiscal striae in spaces 4 and 5 not wider than half the distance between the inner and outer postdiscal striae. All striae pale buff in male and whitish in female, except that in *subperusia* from New Guinea striae are whitish in male, and white in female.

8 (9) Male upperside: violet-blue with a slightly frosted appearance. Female upperside: pale shining blue with a slight purple tinge ; on forewing the black border seldom increases towards tornus (except in wet season form from Ceylon and S. India) and on hindwing the blue colour covers more than half the wing **hermus** (C. Felder, 1860)

9 (8) Male upperside: matt dark bluish-purple. Female upperside slightly deeper blue than *hermus* female ; on fore wing the black border usually increases markedly towards the tornus and on hind wing the blue colour usually covers less than half the wing . . . . . **subperusia** (Snellen, 1896)

10 (7) Underside hind wing: distance between inner submarginal and outer postdiscal striae in spaces 4 and 5 wider than half the distance between the outer and inner postdiscal striae. All striae whitish to white in male and white in female.

11 (12) Male upperside fore wing: black border widens towards costa. Female purple-blue, less shining than in other species of the group . . . . . **asaga** Fruhstorfer, 1916

12 (11) Male upperside fore wing: black border a thread throughout.

13 (14) Male upperside: clear shining bluish-purple (with a greenish sheen in Celebes and the Philippines). Female upperside: pale shining silvery-blue (turning white outwardly in Celebes and the Philippines) . . . . . **sanaya** Fruhstorfer, 1916

14 (13) Male upperside: greyish-blue with a greenish tinge. Female shining sky-blue. Underside hind wing: submarginal series of striae separated and crescentic . . . . **ollyetti** Corbet, 1947

The species *angusta*, *pavana* and *pactolus* are easily recognised and are not dealt with further in this paper. The remaining species are considered to form the *hermus* complex.

It is unfortunate that Snellen's types of *subperusia* were not available to Corbet or myself. Corbet (1948) regarded *subperusia* as a synonym of *pavana*, but the description of the male by Snellen (1896, *Tijdschr. Ent.* **39** : 93)—dark purple-blue on the upper surface—could not apply to *pavana*, which is pale greyish-blue; whilst the figure of the female of *subperusia* in Piepers and Snellen (1918, *Rhop. Java* **4**, pl. xxi, fig. 50d), which shows an insect with a dark cell-end bar on the fore wing, is an excellent likeness of the species dealt with in this paper as *subperusia*. The figure cannot represent *pavana*, since the female of that species never has a dark cell-end bar on the fore wing.

Although some doubt must remain regarding the correct use of *subperusia* until Snellen's male type has been examined, it seems to me preferable in the meantime to adopt the name for the species so dealt with in this paper. This use is, incidentally, in accordance with Toxopeus' classification of the Javanese species (1929, *Tijdschr. Ent.* **72** : 232).

The male genitalia in the *hermus* complex constitute an infallible means of identification. The clasps of *asaga*, *hermus* and *ollyetti* are very distinct and easily recognisable, and have been well illustrated by Corbet (1948). On the other hand, the clasps of *subperusia* and *sanaya* are of the same general pattern and may appear rather similar when distorted by mounting on flat slides. Such distortion, it appears, must have misled Corbet. The clasps of these two species are, however, distinct and absolutely constant throughout their whole geographical range.

In *subperusia* (fig. 1) the distal edge of the clasp is hardly concave and is serrated throughout its length with comparatively few and large spines, the last spine on the ventral extremity being particularly long.

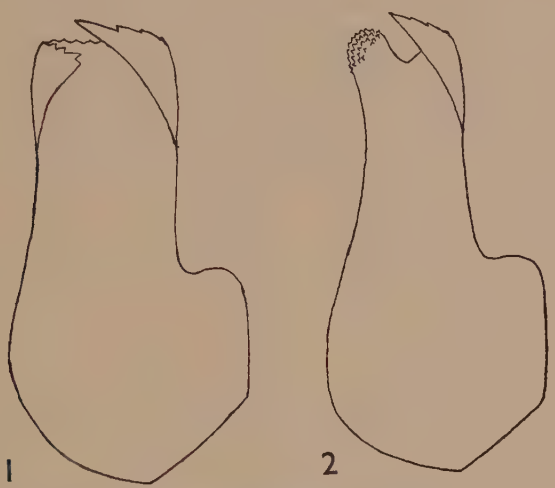
In *sanaya* (fig. 2) the clasp is narrower, and the central portion of the distal edge is smooth and deeply concave. The ventral extremity is strongly pointed, rather as in *subperusia*, whilst the dorsal extremity carries about 30 very small teeth.

The male genitalia of *sanaya* show a remarkable similarity to those of the aberrant Philippine species *sericina* (C. and R. Felder, 1865). It is of interest that the Celebes and Philippine subspecies of *sanaya* show an approach in

facies to *sericina*, and were it not known that both species occur together I would be inclined to treat them as conspecific.

In Neomalaya the difference in ground colour of the upper surface enables fresh males of *N. subperusia* and *N. sanaya* to be recognised at a glance. But in worn or old museum specimens the ground colour of both species fades to a similar shade of bluish-purple, although that of *subperusia* is rather more opaque. Such specimens may be difficult to identify with certainty without dissection. But in the eastern half of their range there is never any possibility of confusion between the two species, the underside markings of *sanaya* having become very wide, prominent and chalk-white, whilst those of *subperusia*, though more whitish, remain narrow and comparatively inconspicuous.

A curious feature of the *hermus* complex is the apparent numerical disparity between the sexes in Neomalaya. In *hermus*, *subperusia* and *asaga* males greatly outnumber females. In *sanaya*, on the other hand, females greatly outnumber males.



FIGS. 1–2.—Clasp of (1) *Nacaduba subperusia* (Snellen); (2) *N. sanaya* Fruhstorfer.

List and distribution of the subspecies in the hermus *complex.*

1. *Nacaduba hermus.*

Subspecies are as given by Corbet (1948).

2. *Nacaduba subperusia*

(*a*) *lysa* Fruhstorfer, 1916—Sumatra (= *intricata* Corbet, 1938—Malaya); also Assam, Burma, Andamans, Siam and Borneo.

Fruhstorfer's female allotype is a female *N. sanaya elioti* Corbet.

(*b*) **nadia** subsp. n.—Nicobar Is.

Male.—Upperside similar to *lysa*. Underside markings rather faint and washed out. On hind wing the black tornal spot in space 2 is very large, as usual in Nicobar representa-

tives of this genus, and is surmounted by a broad orange crescent. Forewing length 15·5 mm.

Holotype ♂, Great Nicobar: 26.ix.1930, (*M. L. Ferrar*). Unique. In British Museum (Nat. Hist.). (B.M. Rhop. Type No. 15919.)

(*c*) *subperusia* (Snellen, 1896)—Java; also Sumba.

A single female from Sumbawa in the British Museum differs from two Javanese females in possessing a larger black tornal spot in space 2 on the underside of the hind wing.

(*d*) **paska** subsp.n.—Sula Is; also Philippines; will probably be found in Celebes.

Male.—Upperside resembles *subperusia*. Underside ground colour pale greyish-brown with a faint purplish tinge and striae dirty-whitish, showing an approach to *martha*, but the submarginal series are linear as usual. Interspaces of submarginal striae more heavily darkened than in any other subspecies. Fore wing length 15·0–15·5 mm.

Holotype ♂, Sula Is.: Sula Besi, x.1897 (*W. Doherty*). In British Museum (Nat. Hist.). (B.M. Rhop. Type No. 15920.) Paratype: One ♂ from Sula Besi in the British Museum. A ♂ from Mindanao, in very worn condition, appears to be identical. A ♀ from Batchian is intermediate between *subperusia* and *martha* and may belong to this subspecies, but I think it more likely that a distinct subspecies will be found in the Moluccas.

(*e*) **martha** subsp.n.—New Guinea; also D'Entrecasteaux Is. and Louisiade Archipelago.

Male.—Upperside as *subperusia*. Underside grey-brown with a faint purplish tinge. All striae whitish and the submarginal series crescentic instead of linear as usual. Fore wing length 13·0–14·5 mm.

Holotype ♂, New Guinea: Geelvink Bay, 1892 (*W. Doherty*). In British Museum (Nat. Hist.). (B.M. Rhop. Type No. 15921.)

Female.—Upperside very similar to *subperusia* but the blue colour slightly more extensive and the black border of the fore wing not increasing towards the tornus. Underside paler than *subperusia*, the striae clear white and the submarginal series highly crescentic. Fore wing length 13·0–14·0 mm.

Allotype ♀, New Guinea: Geelvink Bay, Ron Is., vii.1920 (*C. F.* and *J. Pratt*). In British Museum (Nat. Hist.). (B.M. Rhop. Type No. 15922.) Paratypes: 1 ♂, 1 ♀, Fergusson Is., 1 ♂, 1 ♀, Rossel Is. In British Museum.

I have also seen at Tring 9 males and 4 females from New Guinea, the D'Entrecasteaux Is. and the Louisiade Archipelago. A pair from the Admiralty Is. have the striae clear white in the male and the ground-colour of the under surface slightly darker in the female. It is possible that a distinct subspecies flies there.

3. *Nacaduba asaga*

(*a*) *asaga* Fruhstorfer, 1916—North Borneo.

The female of this subspecies has not yet been described. A female in the British Museum is purple-blue on the upperside, slightly paler than *asaga*

pendleburyi, with broad black borders expanding to 7 mm. at the tornus on the fore wing and extending into the cell on the hind wing. Underside exactly as in male *asaga*.

(*b*) **solta** subsp.n.—Sumatra.

Male.—Upperside bluish-purple with a slightly livid tinge, similar to *N. pactolus odon* Fruhstorfer, 1916, and much purpler than *asaga* or *pendleburyi*. Black border of fore wing less than 1 mm. wide to vein 5, above which it expands to 3–4 mm. Underside browner than *pendleburyi* and the outer pair of discal stripes on the fore wing straighter. Fore wing length 15·0 mm.

Holotype ♂. SUMATRA : Siboga, ii.1903 (*ex Oberthur coll.*). In British Museum (Nat. Hist.). (B.M. Rhop. Type No 15918.) Paratypes, 2 ♂, same data.

(*c*) *pendleburyi* Corbet, 1938—Malaya ; also Rhio Archipelago.

A Malayan male in my collection differs from normal *pendleburyi* in being livid purple with the fore wing border a thread throughout ; underside browner with the striae narrower and more sullied than usual, and the outer pair of discal stripes on the fore wing very straight. It has no androconia (present in normal *asaga*). The specimen, though more like Sumatran *solta* than Malayan *pendleburyi*, gives the impression of being a distinct species, but the genitalia are absolutely typical of *asaga*.

The female allotype of *N. intricata* Corbet is a female *asaga pendleburyi*, as Corbet (1948) pointed out, but is an aberrant example. On the upperside the blue colour is much more shining than in normal females whilst on the under side the specimen bears a rather close resemblance to the aberrant male described above.

It is curious that, whereas the species *hermus*, *subperusia* and *sanaya* are extremely constant throughout Neomalaya, *asaga* should occur in three very distinct subspecies. This, and the apparent frequence of aberrant examples, indicates that *asaga* is a young species with a still unstable constitution.

4. *Nacaduba sanaya*.

(*a*) *elioti* Corbet, 1938—Malaya (= *thalia* Corbet, 1938—Borneo) ; also Assam, Burma, Siam and Sumatra.

In females from Neomalaya the black border on the fore wing seldom expands towards the tornus, and then not markedly. In Burma there is a tendency for the border to expand markedly, and in some examples the blue colour is reduced to a wedge-shaped discal patch. Though some females from Tenasserim are indistinguishable from Malayan females, it is probable that this character is racial in Burma north of Tenasserim. I do not, however, consider it justifiable to denominate a further subspecies on this variable character alone.

(*b*) *naevia* Toxopeus, 1929—Java ; also Bali.

(*c*) *sanaya* Fruhstorfer, 1916—Nias ; also Mentawi Is.

(*d*) *metallica* Fruhstorfer, 1916—Celebes ; also Philippines.

(*e*) There is apparently a further subspecies in the Moluccas.

A male from Amboyna in the British Museum resembles *naevia* on the upperside and *metallica* on the underside. The specimen is in poor condition, has lost its abdomen and is unsuitable to become a type specimen. I do not, therefore, propose to denominate this race.

5. *Nacaduba ollyetti*

Known only from Ceylon in a single form.

Acknowledgments.

I wish to thank the authorities of the British Museum (Nat. Hist.) for permitting me to examine the types and other material in the national collection ; in particular, I am grateful to Mr. Neville Bennett who dissected several Museum specimens for me.

AFRICAN SPECIES OF THE *BOMBYLIUS DISCOIDEUS* FABRICIUS—GROUP (DIPTERA : BOMBYLIIDAE).

By S. J. Paramonov.

The typical species of this group, *B. discoideus* Fabricius, is better known under the name of *B. analis* Fabr., but *B. analis* Fabr. (1794 : 408) is a *nomen praeoccupatum* by Olivier, 1789. The name *discoideus* Fabr., 1794 : 409 must therefore replace the name *analis*. Fabricius (*Ent. Syst.* IV.) described the sexes of this species as different species.

Key to species of the *discoideus*-group.

1 Males (eyes touching or nearly touching at one point) 2
– Females (eyes always divided by a broad frontal stripe) 14
2 Length of wings 14–19 mm. Abdomen above without lateral and median spots of white or fulvous, depressed, hair-like scales . . 3
– Length of wing not longer than 12 mm. Abdomen above with lateral and median spots of depressed hair-like scales (white or fulvous) 11
3 Mesonotum covered by dark-brown, nearly black, very dense, erect hairs 4
– Mesonotum covered with yellowish, yellow or bright orange hairs . 9
4 Hairs of abdomen black, but with a median row of large rounded tufts of yellow or orange hairs . . . . . **fulvonotatus** Weidemann
– A row of median yellow or orange tufts absent 5
5 Abdomen with a transverse band of orange hairs towards middle. Wings without any yellowish tinge 6
– Abdomen without a transverse band of orange hairs in the middle. Wings with distinct yellowish tinge or hyaline 7
6 Tip of abdomen with a large tuft of white hairs . . . **bombiformis** Bezzi
– Tip of abdomen clothed with black hairs, which are only narrowly white at distal extremity . . . . . **bicoloratus** Bezzi
7 Apex of abdomen occupied by a tuft of predominantly snow-white hairs, only laterally below with yellow or orange hairs (= *analis* F.) **discoideus** Fabricius
– Hairs on apex of abdomen entirely yellow or orange 8
8 Discal cell very acute apically and without, or barely with any apical cross-veins. Length of wing, 18–19 mm. Apical tuft of orange-yellow hairs more extensive, broader and more conspicuous **haemorrhoidalis** Bezzi
– Discal cell more subacute apically and with more distinct apical cross-vein. Length of wing 15–17 mm. Apical tuft of abdomen less extensive and less conspicuous **haemorrhoidalis** Bezzi var. **waterbergensis** Hesse
9 Wings suffused with fuscous towards middle . . . . **suffusus** Walker
– Wings hyaline or slightly suffused on whole surface 10
10 Mesonotum, scutellum and abdomen above clothed with yellowish hairs. Face black-haired . . . . . **uniformis** sp. n.

— Mesonotum on anterior half with orange hairs, on posterior with yellow; scutellum and abdomen above black-haired, but tip of abdomen with snow-white tuft . . . . . **flagrans** Bezzi

11 Hairs on body above and below predominantly black. Abdomen above with a central row of rounded spots of orange or fulvous depressed scales . . . . . **vansoni** Hesse

— Hairs on body above and below predominantly white 12

12 Discal cross-vein only a little beyond middle of discal cell. Wings with only the extreme base very dark brown; costal cell, narrow basal part of marginal cell and upper part of basal half of first basal cell slightly yellowish . . . . . **acroleucus** Bezzi

— Discal cross-vein considerably beyond middle of discal cell. Wings very dark brown at base, passing into a yellowish costal cell and yellowish basal half of first basal cell, etc. (see below), or distinctly yellowish from base to the discal cross-vein 13

13 Eyes touching for a distance a little shorter than ocellar triangle. Disc of scutellum, second, third and fourth tergites reddish. Extreme base of wings yellow . . . . . **aequisexus** sp. n.

— Eyes almost touching at a point a little in front of front ocellus, then rapidly diverging apically. Ground colour of body black. Wings with base very dark brown or blackish-brown, passing into a yellowish costal cell and yellowish basal half of first basal cell and a brownish or even dark-brownish basal half of marginal cell, basal half of first submarginal cell and apical half of first basal cell; these latter brownish infuscations forming a characteristic quadrate dark patch . . . . . **hypoxanthus** Loew

14 Mesonotum, head, thorax and abdomen (except orange tuft at tip), black-haired. Squamae fringed with very long and dense black hairs, which are scarcely visible on surrounding dark ground **haemorrhoidalis** Bezzi[1]

— Mesonotum at least with intermixed greyish hairs, mostly white, yellowish or orange-haired 15

15 Head black-haired. Squamae fringed with black hairs. Hairs of abdomen black, but with a median row of large rounded tufts of yellow or orange hairs. Mesonotum clothed with intermixed black and white hairs . . . . . **fulvonotatus** Wiedemann

— Head with white, yellowish or orange hairs. Abdomen above without a row of orange tufts, at most only spots of depressed scales present. Squamae fringed with white hairs (except *B. flagrans*). Mesonotum with white, yellowish or orange hairs 16

16 Squamae fringed with black hairs. Frons and face with orange hairs. Mesonotum, particularly on front part, with bright orange hairs **flagrans** Bezzi

— Squamae fringed with long white hairs, which contrast with surrounding dark-haired area. Head with white hairs. Mesonotum with white, yellowish or yellow hairs 17

17 Length of wing 14–19 mm. Abdomen without lateral and median spots of white or fulvous, depressed, hair-like scales 18

— Length of wing 14 mm. or less. Abdomen above with lateral and median spots of depressed hair-like scales 22

18 The pleurae below root of wings as a rule with long and distinct black bristles; abdomen tricoloured; black at base, orange in middle, white at tip 19

[1] See also var. *waterbergensis* Hesse, couplet 8.

— Pleurae with white bristles, or with indistinct ones; praesutural bristles with white tips; abdomen with only black and white hairs, or orange hairs cover the tip of abdomen 20

19 Abdomen black at base, yellow in middle, white at end; wings with yellow veins . . . . . **bombiformis** Bezzi

— Abdomen black at base, yellow on sides, in middle and at end covered with white-tipped black hairs; wing veins black . . **bicoloratus** Bezzi

20 Mesonotum, scutellum and abdomen above uniformly yellowish-haired. Frons with yellow, face with black hairs . . **uniformis** sp. n.

— Mesonotum with pure white, yellowish or greyish hairs; base of abdomen always black-haired; tip with snow-white, yellowish or orange hairs 21

21 Mesonotum with white hairs, at most slightly yellowish along the base of scutellum. Hairs on tip of abdomen white, laterally below yellow. Typical form . . (= *analis* Fabr.) **discoideus** Fabricius

— Hairs on mesonotum, particularly on posterior half, distinctly yellowish. Apical tuft of abdomen as in typical form **discoideus** Fabr. var. **trichroma** var. n.

— Mesonotum as in *B. discoideus* var. *trichroma*, but tip of abdomen distinctly yellow-haired . . . . . var.

22 Discal cross-vein only a little beyond middle of discal cell. Wing pattern see couplet 12 . . . . . **acroleucus** Bezzi

— Discal cross-vein considerably beyond middle of discal cell, see couplets 12 and 13 23

23 Extreme base of wing yellow, similar to other yellow marking along the anterior margin (to apex of subcostal vein and discal cross-vein). Scutellum reddish. Two spots of white depressed scales in middle of second and third tergite; similar spots at sides on fourth, fifth and sixth tergites. Underside of abdomen predominantly black-haired, with two spots of white scales laterally at middle of abdomen **aequisexus** sp. n.

— Extreme base of wing darker than the other marking of wing. Scutellum black. Disposition of white spots different, a large patch basally on each side of second and third tergites, etc. **hypoxanthus** Loew

Note.—The females of *B. suffusus* Walker and *B. vansoni* Hesse are unknown.

Bombylius discoideus Fabricius : var. **trichroma** var. n.

Differs from typical form in the presence of bright orange hairs on basal half of white tuft on underside of abdomen. Hairs in front of scutellum on mesonotum are also rather bright yellow. The systematic value of this form is not clear; only a large series of specimens from different localities can solve the problem of subspecies, etc., in this very widely distributed species.

Type in British Museum (Nat. Hist.); co-type in author's collection. Tanganyika T.: S. of Bukavu, 1 ♀, viii.1931 (*Cockerell*); Bwamba, 1 ♀, vii–viii.1946 (*van Someren*); Ngara Ngito, 1 ♀ (*Dr. Lewis*). Gold Coast: N. Territories, Laura, 1 ♀, 10. ix.1930 (*W. Cook*). Kenya: Nairobi, 1 ♀, 20.ii.1936 (*Turner*) (? this form—the apex of abdomen is lost). Ger. E. Africa: Ufiomi, 1 ♀, 3.vi.1916 (*Capt. W. A. Lamborn*). Transvaal: Pretoria, 3 ♀, 1911 (*W. L. Distant*).

Typical form: S. Rhodesia: Balla Balla, 1 ♂, iii.1931 (*A. Cutbertson*); S. Africa: Mafeking, 1 ♂, 24.ii.1934 (*J. Ogilvie*). Transvaal: Pretoria, 1 ♂

(*W. L. Distant*). TANGANYIKA: Mbeya, Lake Rukwa, 1 ♀ (*E. Ross*); Rabai, 1 ♀, viii.1930 (*van Someren*). GOLD COAST: N. Territories, Diari, 1 ♀, 17.iii.1913 (*Jas. J. Simpson*).

Bombylius haemorrhoidalis Bezzi.

1921, *Ann. S. Afr. Mus.* **18**: 9; Bezzi, 1924, *Bombyliidae Ethiop. Reg.*: 36; Hesse, 1938, *Ann. S. Afr. Mus.* **34**: 120.

The mistake made by Bezzi (1924: 33) in stating that the female has white hairs on head and thorax was corrected by Hesse (1938: 121)—the hairs are black as in the male.

The author has seen: NYASALAND: Blantyre 1 ♂, 1 ♀, 7–11.iv.1910, 3500 ft. (*S. A. Neave*). TRANSVAAL: Pretoria, 1 ♂, (B.M. 1911—383) (*W. L. Distant*).

Var. *waterbergensis* Hesse, 1938. This was described by Hesse as a variety of *B. discoideus*, but the black fringed squamae in both sexes show that it belongs to the present species.

Bombylius bombiformis Bezzi, 1924.

A female before me, labelled S. RHODESIA, 1926–29 (*H. S. Leeson*), is a form intermediate between *B. bombiformis* and *B. bicoloratus*. The cross band of orange hairs is not interrupted in the middle as in *B. bombiformis*, but the white hairs at the end of the abdomen have black bases, as in *B. bicoloratus*.

It is very probable that *B. bicoloratus* is only a colour variety of *B. bombiformis*.

Bombylius flagrans Bezzi, 1924.

A second female specimen of this species labelled BRIT. E. AFRICA: Yala R., Sth. edge of Kakumanga forest, 4800–5300 ft., 21.28.v.1911 (*S. A. Neave*), is before me.

The vertex equals about one-fifth of head width. Basal two segments of antennae black-haired, some similar hairs on sides of bases of antennae. No other differences from Bezzi's description.

Length of wing 19·5 mm.

The male has not previously been seen. I append a description of this sex.

Male.—Ground colour black, only the sides of scutellum a little reddish. Hairs on head and its parts (except the upper half of occiput) black. Sides of face with long and dense hairs, but with bare median stripe, only at apex of face a small tuft of hairs. Eyes quite touching for a distance as long as ocellar triangle. Facets on upper half of eye much larger than on lower half. Palpi short (half the length of mouth cavity), rather thick, with some bristle-like hairs. Proboscis long, with small, long labellae. Third segment of antennae very long, conical, nearly twice as long as two basal segments together. Upper part of occiput with long bright orange or yellow hairs, which are a little longer behind hind margin of eyes; not bordered by a very long fan-like row of hairs.

Mesonotum with dense, erect hairs cut off at same level as in other species of *discoideus* group; they are bright-orange on anterior, paler on posterior portion. Bristles of mesonotum and scutellum numerous, black; hairs on scutellum predominantly black. Underside of thorax with dense, long black hairs.

Wings hyaline. Squamae (black-fringed), alula and extreme base of wing (only to the base of both basal cells) dark-brown, nearly black. Cross-vein r-m distinctly beyond

middle of discal cell; apical cross-vein of discal cell short, but not punctiform. Veins yellowish-brownish. Legs and halteres black.

Abdomen black, black-haired, only last two segments with snow-white hairs.

German East Africa: Itigi 1 ♂, 15.iv.1917 (*G. D. H. Carpenter*). Tanganyika: W. Shore of L. Manyara, 3 ♂, ii–v.1935 (*B. Cooper*). Brit. E. Africa, Masai Reserve, 1 ♂, 21.iv.1913 (*T. J. Anderson*). Brit. E. Africa: Magadi, 1 ♂, iv.1912, (*F. G. Hamilton*).

Bombylius uniformis sp. n.

Belonging to *B. discoideus* group, but differing in its uniformly yellowish hairs on occiput, mesonotum and abdomen above.

Head in proportion absolutely similar to *B. discoideus*. Hairs on ocellar triangle, front, antennae and face deep black, in female only the frons is predominantly yellow-haired, the colour rather bright. Hairs on occiput extremely dense, erect, bright-yellow; hairs on anterior part of thorax also bright-yellow but distinctly paler on other parts of mesonotum, scutellum and abdomen. The strongest bristles on the thorax and scutellum black, the others, particularly on the mesopleurae, yellow. Legs black. Halteres brown. Venation exactly as in *B. discoideus*, also the dark marking at base of wings; wings greyish-hyaline, only on the anterior border traces of yellowish colour. Alula brown, its fringe, as also of squamae, yellow. Underside of thorax with dense and long yellowish hairs, only the coxae with tufts of deep black hairs.

Hairs on tergites uniformly yellowish, but their basal part (one-third to one-fifth) brown or black when visible in rubbed specimens. Underside of abdomen dense-haired, with deep black hairs, but on the sides yellow hairs are predominant.

Length of body 15–16 mm., of wing 15–16 mm.

Kenya: Teita Hills, ♂ type, 2 ♂, 1 ♀, viii.1947; Ngong, 2 ♂, 2 ♀, iv–vi.1934; Meru, 1 ♂, vii.43. Jombeni Hills, 1 ♀, v.1947; Nairobi, 1 ♀, 26.xii.1933; 2 ♀, vii.1930. (All coll. *G. van Someren*).

The type in British Museum (Nat. Hist.); paratypes there, in author's collection and in Coll. van Someren.

Bombylius aequisexus sp. n.

This new species is closely related to *B. hypoxanthus*. Very similar to *B. discoideus*, but the male is female-like with white-haired thorax.

Ground colour of body black, but disc of scutellum reddish; in male second, third and fourth tergites also reddish, but ground colour almost invisible through the extremely dense hairs. Face, frons and occiput with very dense, snow-white hairs, which are very long on the face. First segment of antennae on upper side also with white hairs, but on underside hairs much longer; only hairs on the ocellar triangle black. Female with a strong black bristle at apex of upperside of second antennal segment. Proportions of antennae: 1·5 : 1 : 5·5; third segment in male very narrow, in female broader. Proboscis long. Line of contact of eyes in male a little shorter than the ocellar triangle. Vertex of female three times as broad as the ocellar triangle, and about one-fourth of the head width.

Thorax above and below in both sexes covered with dense white hairs, which, in male, have a yellowish-whitish, *nearly invisible nuance*. All bristles black. Female with rather numerous black hairs intermixed on mesonotum, which form one narrow longitudinal and two sublateral, shorter stripes, but these stripes are not very well developed. Bristles and hairs on scutellum black. Legs black, with black bristles, spinules and hairs. Halteres black.

Wings nearly hyaline, but with a sharply marked, rather bright-yellow stripe along anterior border up to apex of subcostal vein, then to vein r-m and along the fourth longitudinal vein to base of wing; basal cells also yellow. Alula brown, as in *B. discoideus*, but prebasal cell bright-yellow, not dark.

Venation as in *B. discoideus*. Alula darkened, on inner margin with whitish hairs, the apical and outer parts with darkened hairs (in both sexes the same).

Abdomen in male covered with extremely dense, black, erect hairs on first three tergites, remainder with snow-white hairs. On the middle of second and third tergites two very small white tufts; on last three tergites under the dense, white, erect hairs two parallel stripes also of depressed snow-white hairs, shorter and more scale-like; underside in male black-haired, with two sublateral short, white stripes on sides of second and third sternites. Abdomen of female with hairs similarly distributed, but the erect white hairs on last three segments are much shorter and sparser, and the two longitudinal stripes of depressed hairs are more developed, scale-like.

Length of body 13–15 mm., of wing 14–15 mm.

Holotype ♂, Kasingau, xi.1938. 1 ♂, 3 ♀ paratypes, same data as type. The types in British Museum (Nat. Hist.); one female co-type in author's collection.

NEW AND LITTLE-KNOWN LOPHOPIDAE AND ISSIDAE FROM AUSTRALASIA (HOMOPTERA : FULGOROIDEA).

By R. G. Fennah, M.A., F.R.E.S.

The Lophopidae and Issidae discussed below were mostly collected in the Solomon Islands by H. T. Pagden (H. T. P.) and R. A. Lever (R. A. L.) and form a useful contribution to our meagre knowledge of the fauna of this group, which appears to have been the first stepping stone on the main southern route of fulgoroid migration eastward into the Pacific as the Palau Islands have been the first on the northern.

As far as material has allowed the divergence of insular populations has been studied : the differences which have been recorded are the most obvious or the most easily described and are in no sense an exhaustive enumeration of those which are likely to be found on closer study of larger samples. The formal proposal of subspecific epithets has been deliberate and is intended to emphasise the relative magnitude and the " non-linearity " of changes in the characters examined.

The writer's thanks are tendered to the authorities of the British Museum (Nat. Hist.) and to Dr. W. E. China for the privilege of examining this material, all of which[1] including the holotypes, is the property of the Museum.

Lophopidae.

Painella Muir.

Muir, 1931, *Rec. Aust. Mus.* **18** : 77. Orthotype, *Painella harti* Muir.

Painella simmondsi Muir.

Muir, 1931, *loc. cit.* : 80.

7 ♂ and 8 ♀, Solomon Is. ; Guadalcanal : Tenaru, 3.x.1938, 30.ix.1935 (*R. A. L.*) ; Suavati, 29.iv.1934 (*R. A. L.*) ; Ruavatu, 29.iv.1934 ; Kookoom, 7.xii.1933, (*H. T. P.*), xi.1932 (*R. A. L.*) ; Lunga, 9.vii.1933, xi. 1932, 6.iii.1935 (*R. A. L.*) ; Kaukau, 22.viii.1934 (*R. A. L.*) ; Rere, 12.viii.1934 (*R. A. L.*) ; Tulagi, 19.xii.1931 (*R. A. L.*). 3 ♀, San Cristobal, 12.x.1932 (*R. A. L.*) ; Waia, 8.v.1935 (*R. A. L.*). 1 ♀, Vella Lavella : Parasso, 22.v.1935 (*H. T. P.*). 2 ♀, Russell Id. : Pepesala, 19.ix.1934 (*R. A. L.*) ; Caramola, 20.ix.1934 (*R. A. L.*) ; Somata, 22.ii.1934 (*R. A. L.*). 1 ♀, Ulawa : 19.v.1934 (*R. A. L.*). 3 ♂ and 2 ♀, Malaita : Supaina, 20.iv.1934 (*R. A. L.*) ; Ngela, 11.iii.1934 (*R. A. L.*). 1 ♂ and 2 ♀, Santa Isabel Id. : Fatua, iii.1932, iii.1933 ; Tatamba, 27.vi.1935 (*R. A. L.*).

Painella harti Muir.

Muir, 1931, *loc. cit.* : 78.

1 ♂ and 1 ♀, Solomon Is. ; Guadalcanal : Popanu, 500 ft., 15.xii.1934 (*R. A. L.*) ; Lunga, 1.iv.1934 (*R. A. L.*). 1 ♂, Santa Isabel Id. : Tatamba, 11.vii.1935 (*R. A. L.*).

[1]With the exception of *Clonaspe sanquinosa bougainvillei* ssp.n.

Clonaspe gen. n.

Vertex in male longer in middle line than broad, in female scarcely broader than long, posterior margin transverse, lateral margins subparallel, anterior margin shallowly convex, disc not depressed, medially carinate except at apex, carinae very little raised; frons in middle line, as seen in anterior view, slightly longer than broad at widest part (1·1 : 1), half as wide at narrowest point as at widest, apparent basal margin in anterior view convex-truncate, lateral margins diverging to below level of antennae, thence incurved to suture, laterodistal angles rounded, about 110°, basal portion of frons curving toward upper surface of head to meet vertex, amply visible in dorsal view, not traversed by a median carina, median discal area of frons demarcated by basal and lateral carinae and traversed by median carina; clypeus elongate, medially and laterally carinate; rostrum extending beyond mesotrochanters, penultimate segment about six times length of apical segment, antennae with first segment ring-like, second subovate, twice as long as broad. Pronotum in middle line very approximately half as long as vertex, disc slightly broader across base than long in middle, anteriorly obtusely rounded, distinctly tricarinate, mesonotum broader than long, subequal to length of head and pronotum combined, tricarinate; pro- and meso-femora and tibiae only moderately expanded, tibiae more so than femora; post-tibiae bispinose, with an irregular row of six spines at apex; basal metatarsal segment not swollen, with a group of seven spines near end at apex. Tegmina 2·5 times as long as broad, costal margin shallowly convex, apical margin evenly rounded with its most distal portion slightly flattened; costal area narrow, slightly wider distally with transverse veinlets beginning near middle, becoming of regular size two-thirds from base; apical veinlets long, parallel, about 25 cells around apical margin between node and apex of clavus, Sc + R forked near base, Sc, R, M and Cu_1 forking about level with a line from union of claval veins to node. Wings as in *Menosca*. Anal segment of female tubular, elongate, with a pair of small ceriferous plates at apex, each not greatly exceeding length of anal style. Ovipositor with third valvulae with ceriferous plates very large.

Type species: *Clonaspe sanguinosa* sp. n.

This genus is distinguished from *Katoma* Baker by the vertex being at least as long as broad in the male, the frons smooth and subtumid at base, and medially carinate distally, and the costal area of the tegmina traversed by only a few veinlets; from *Painella* it differs abundantly in the shape of the head and of the second antennal segment, and from *Menosca* Stål in the structure of the costal area of the tegmina and in the shape of the antennae.

Clonaspe sanguinosa sp. n. (Fig. 1, A–J).

Vertex of male 1·3 times as long in middle line as broad, in female 1·1 times as broad as long; subapical segment of rostrum 6·5 times length of apical.

Pygofer with dorsolateral angles produced in a bluntly-rounded lobe. Aedeagus U-shaped in profile, phallobase with a small finger-like lobe near base, directed ventrad, a deep cleft on each side apically, upper and lower limbs of cleft each with a pointed lobe on dorsal margin at middle and at apex; a pair of phallic appendages, each tubular, curved dorsad distally then reflexed and directed posteriorly near apex, a deeply curved process attached laterally near base, directed ventrad then cephalad; dorsal margin distally straight, apex acute. Genital styles about 2·6 times as long as broad with a small recurved spine on dorsal margin near apex.

Male: Length, 6·4 mm.; tegmen, 7·0 mm. *Female:* Length, 8·0 mm.; tegmen, 11·8 mm.

16 ♂ and 14 ♀ from localities as listed below. Holotype male from Solomon Is.: Shortland Id.

This species is represented in the archipelago by a number of forms differing slightly in the shape of the pygofer and in pigmentation ; these are recognised here as geographical subspecies.

Clonaspe sanguinosa **ulawana** subsp. n. (Fig. 2A.)

Base of clypeus and smooth base of frons entirely red in both sexes, tegmina more or less uniformly brown, dorsal surface powdered brown or tawny in patches. Post-tibiae fuscous-piceous as figured.

1 ♂ and 6 ♀, Ulawa, 19.v.1934 (*R. A. L.*).

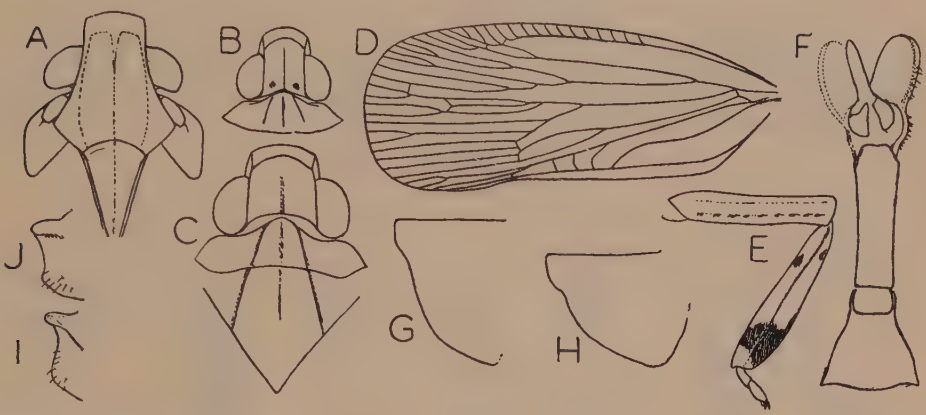


Fig. 1.—*Clonaspe sanguinosa* sp. n. A, Frons and clypeus ; B, vertex and pronotum (male) ; C, ditto (female) ; D, tegmen ; E, foreleg ; F, anal segment of female ; G, profile of ventral surface of pygofer (Shortland Id.) ; H, ditto (Vella Lavella) ; I, lateral process of pygofer (Shortland Id.) ; J, ditto (Vella Lavella).

Clonaspe sanguinosa **inusta** subsp. n. (Fig. 2, B, G.)

Frons with laterobasal areas between apex of vertex and base of discal area of frons with V-shaped piceous markings with their apices almost meeting in middle line ; clypeus red at base. Tegmina brown marked fuscous in short transverse bars on corium and in four areas on membrane in form of a broad chiasma ; dorsal surface powdered brown.

7♂ and 4♀, Vella Lavella : Parasso, 22.v, 1934 (*H. T. P.*) ; Sanggarama Est., 25.ix.1933 (*H. T. P.*).

Clonaspe sanguinosa **tenaruana** subsp. n. (Fig. 2, C.)

Base of clypeus and frons within median discal area red ; base of frons brown, tegmina brown, coarsely striped with fuscous on corium, membrane more or less evenly suffused fuscous, margin darker. Protibiae marked as figured.

1 ♂, Guadalcanal : Tenaru River, 17.xi.1935 (*R. A. L.*).

Clonaspe sanguinosa **nggelana** subsp. n. (Fig. 2, E.)

Clypeus and frons reddish-piceous, vertex mostly infuscate with a trapezoidal patch anteriorly and two spots posteriorly dark. Protibiae marked as figured. Tegmina reddish-fuscous.

1 ♀, Malaita : Nggela, 20.iii.1934, on *Areca* (*H. T. P.*).

Clonaspe sanguinosa **floridana** subsp. n. (Fig. 2, E.)

Clypeus and frons reddish-piceous in male with two green transverse bars, vertex as in *nggelana* but fuscous markings fainter. Protibiae marked as figured. Tegmina brown with transverse paler bars slightly anastomosing; transverse veinlets on membrane pale; waxy secretion concolorous.

1 ♂ and 1 ♀, FLORIDA, ix.1932 (*R. A. L.*).

This subspecies is very similar to that from Nggela and is most readily distinguished by the extent of the pallid tracts on the tegmina.

Clonaspe sanguinosa **sanctae-isabellae** subsp. n. (Fig. 2, F.)

Clypeus at base and most of frons red, smooth basal part of frons glistening piceous, vertex with a trapezoidal area and two spots fuscous, two small transverse lenticular areas on frons green. Tegmina pale brown with a few fuscous markings on corium, membrane mostly infuscate, transverse veinlets pale brown with reddish-brown waxy secretion.

2 ♂, SANTA ISABEL: Haivo, 6.vii.1935 (*R. A. L.*).

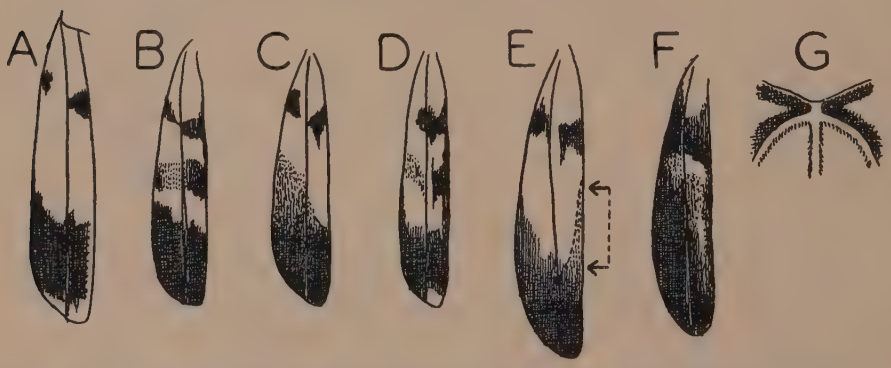


FIG. 2.—A, *Clonaspe sanguinosa ulawana* ssp. n., protibia; B, *C. sanguinosa inusta* ssp. n., protibia; C, *C. sanguinosa tenaruana* ssp. n., protibia; D, *C. sanguinosa sanguinosa* ssp. typ., protibia; E, *C. sanguinosa nggelana* ssp. n., protibia (portion of margin between arrows dark fuscous); *C. sanguinosa floridana* ssp. n., protibia (portion of margin between arrows red); F, *C. sanguinosa sanctae-isabellae* ssp. n., protibia; G, *C. sanguinosa inusta* ssp. n., laterobasal areas of frons and base of frontal disc.

Clonaspe sanguinosa **bougainvillei** subsp. n.

Base of clypeus, two transverse bars on frons, area between base of medial disc of frons and apex of vertex, carinae of vertex, and sides of head near margin crimson; two triangular areas between vertex and frontal medial disc piceous, disc of vertex with a trapezoidal area anteriorly and a pair of large round spots posteriorly fuscous; head otherwise pale green. Protibiae as in typical subspecies, but upper two transverse bands complete.

BOUGAINVILLE: 1 ♂, Siwai, 1.x.1922, and 1 ♀, Soraken, 9.ix.1922 (*E. O. Pockley*); a further (mutilated) specimen taken by the same collector, Banoni, x. 29, 1922, is a "melanic" form of reddish-piceous hue in all parts.

Clonaspe sanguinosa sanguinosa subsp. typ. (Fig. 2, D.).

Frons green, two transverse bars, base of discal area, and base of clypeus red; base of frons basad of discal area with an incomplete fuscous triangle on each side, vertex pale.

Tegmina mostly light brown, seven moderately large lenticular marks and a few small stripes on corium fuscous, membrane with a broad fascia of subparallel transverse narrow stripes, and distally a uniform sinuate band fuscous.

3 ♂ and 1 ♀, Shortland Id.: Hisiai R., 22.x.1936 (*R. A. L.*).

Lophops Spinola.

Spinola, 1839, *Ann. Soc. ent. Fr.* 8 : 387. Haplotype, *Lophops servillei* Spin., 1839, *loc. cit.*: 388, pl. 10, fig.3.

Lophops tigris sp. n. (Fig. 3, B, E–J.)

Vertex in middle line longer than broad (1·5 : 1) and longer than basal portion of frons viewed from above (2·25 : 1), lateral carinae of discal area of frons almost in same line as lateral carinae of vertex, frons with lateral carinae distinct but disc not deeply sunken. Tegmina acute at apex, apical margin bent in M through 125° in female.

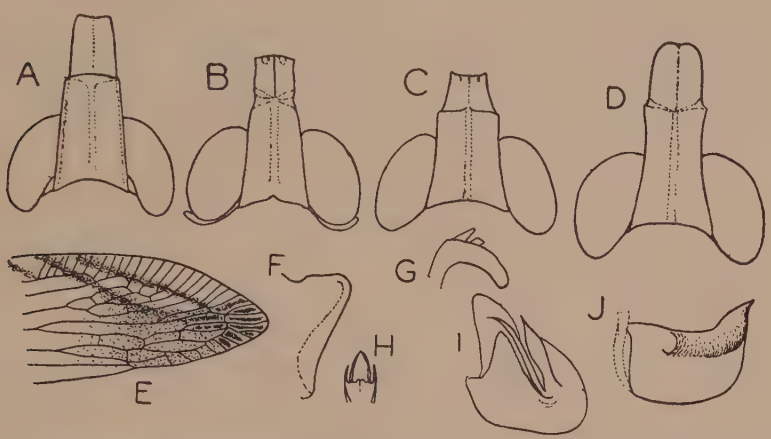


Fig. 3.—A, *Lophops saccharicida* (Kirk.), vertex; B, *Lophops tigris* sp. n., vertex; C, *Lophops zebra* Wlk., vertex of type specimen; D, *Lophops servillei* Spin., vertex. *Lophops tigris* sp. n.; E, apex of tegmen of female; F, hind margin of pygofer, left side; G, anal segment of male; H, apex of aedeagus, ventral view; I, aedeagus, left side; J, right genital style, inner surface.

Pale dull yellow, vertex and intercarinal area of pronotal disc more or less infuscate with a few spots elsewhere. Tegmina dull stramineous, very sparsely flecked with fuscous, a series of parallel oblique bands across costal area, the distal pair extending into membrane, fuscous, apical cells near angle medially piceous.

Anal segment of male short, strongly decurved, almost as broad as long. Pygofer tubular, dorsolateral angle 60°. Aedeagus in form of a tube with folded walls, a pair of broad sclerotised plates laterodorsally forming the roof; laterally, on either side, a row of three processes, all directed dorsad, the basal process triangular, the second slender, subspinose, curved cephalad at apex, the third lanceolate; ventral portion of aedeagus sclerotised in basal half, submembranous in distal half and folded fanwise in toward middle line, apical margin sinuate. Genital styles 1·5 times as long as broad at middle, ventral margin convex, dorsal margin shallowly concave, apical process subconical and feebly sclerotised.

Male: length 4·6 mm., tegmen 6·0 mm.; *Female:* length, 6·0 mm., tegmen 8·1 mm.

5 ♀, Guadalcanal : Lunga, v–vi.1935 (*R. A. L.*). Holotype and 1 ♂ and 2 ♀, Vella Lavella ; Dobeli, Liani Estate, 23.ix.1933 (*H. T. P.*).

This species most closely resembles *L. saccharicida* (Kirkaldy) but differs in the shape of the vertex, in the relative lengths of vertex and base of frons as seen from above, in the markedly less sunken disc of the frons and in the more acute apex of the tegmina in corresponding sexes. For comparison with *L. tigris* figures are given of the head of *L. zebra* Walker, *L. saccharicida* (Kirkaldy) and *L. servillei* Spinola.

Zophiuma gen. n.

Vertex broader than long (about 1·25 : 1), posterior margin very shallowly excavate, lateral margins parallel, anterior margin broadly convex, disc very slightly depressed anteriorly, not at all depressed posteriorly, medially carinate in basal third, carinae not raised ; frons in middle line shorter than broad at widest part (1 : 1·2), widest part 1·75

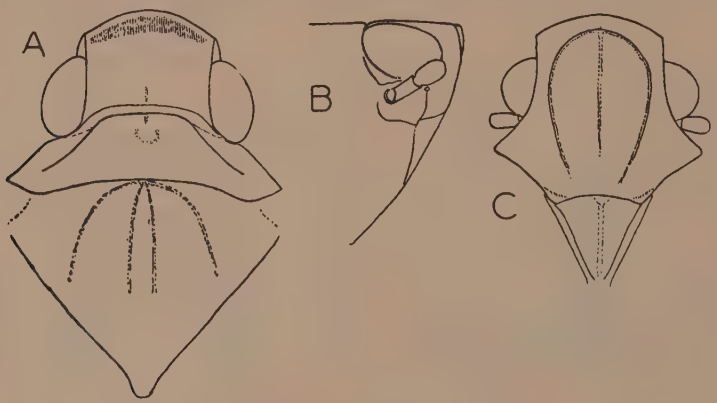


Fig. 4.—*Zophiuma pupillata* (Stål). A, head and thorax ; B, head in profile ; C, frons and clypeus.

times width across base, basal margin in facial view broadly convex, lateral margins diverging to below level of antennae, thence incurved to suture, latero-distal angles subacute, about 80°, base of frons meeting apex of vertex acutely, medial disc longer than broad (1·3 : 1), tricarinate, carinae not attaining frontoclypeal suture ; clypeus about two-thirds as long as frons, medially and laterally carinate, lateral areas slightly visible in anterior view ; rostrum long, apical segment 1·5 times as long as broad, subapical segment 8 or 9 times as long as apical, third segment twice as long as apical, antennae with basal segment cylindrical, slightly longer than second. Pronotum in middle line shorter than vertex (1 : 1·4), discal area 2·5 times as broad across base as long in middle line, median carina absent, lateral carinae widely divergent basad, not attaining hind margin ; mesonotum broader than long (1·2 : 1), longer than head and pronotum combined (1·3 : 1), lateral carinae of disc curved mesad anteriorly, submedially a pair of parallel carinae united anteriorly ; pro- and mesotibiae compressed but not widened, post-tibiae trispinose with nine spines at apex ; basal metatarsal segment with nine spines not forming a regular pad, second metatarsal segment small, ovoid, smooth. Tegmina about 3·5 times as long as broad, apical margin broadly rounded, costal area very narrowly present throughout, stigma not developed differently from apical costal veinlets, Sc+R, M, and Cu_1 forked almost at same level, membrane with more than 20 rows of cells, claval veins united distad of middle. Anal segment of female and third valvulae very large, ceriferous.

Type species: *Acarna pupillata* Stål, 1863, *Trans. ent. Soc. Lond.* **3**: 586.

This genus, which also includes *Kasserota doreyensis* Distant, is separated from *Kasserota* by tegminal venation and from *Megacarna* by the shape of the head, antennae and female genitalia.

Onycta gen. n.

Vertex 1·27 times as broad as long; medial area of frons between sublateral carinae 1·8 times longer than broad, measured between frontoclypeal suture and union of sublateral and median carinae. Antennae with basal segment very short, ring-like. Head and thorax otherwise as in *Zophiuma*. Tegmina 3·2 times longer than broad, hyaline between veins, costal vein at anterior margin, stigma elongate, six-celled, Sc+R fork distad of Cu 1 fork, about nine cells between base of stigma and apex of clavus, counted along a straight line between these points, claval veins united at middle of clavus. Anal segment of female moderately large, third valvulae very large.

Type species: *Kasserota tessellata* Distant, 1888, *Trans. ent. Soc. Lond.* **1888**: 488, pl. 13, fig. 7.

In the shape of the head and limbs this genus is very similar to *Zophiuma* and, while slight differences are discernible (as described), would scarcely have been considered worthy of separate recognition but for the strikingly different tegmina and female genitalia as well as the entire facies of the colour-pattern.

Issidae.

Lollius Stål.

Stål, 1866, *Hem. Afr.* **4**: 209; 1870, *Öfv. vet. akad. Förh*: 762. Orthotype, *Lollius australicus* Stål, 1870, *loc. cit.*: 763.

Lollius acis sp. n. (Fig. 5, A–C.)

Greenish-yellow, heavily marbled and speckled fuscous; most of lateral fields of pronotum behind eyes, and lateral fields of mesonotum, castaneous-fuscous; clypeus and a transverse band at middle and apex of pro- and mesofemora and tibiae more heavily mottled fuscous than elsewhere. Tegmina greenish-yellow, moderately translucent, veins more or less concolorous, veins and veinlets raised, the areas between the veins lightly suffused fuscous; about thirteen dark spots along costal margin and six intervenally on apical margin. Wings fuscous, veins concolorous but edged darker.

Anal segment, pygofer and genital styles of usual pattern for the genus, as figured. Aedeagus with phallobase (periandrium) with a pair of weakly sinuate stout spines arising from middle of dorsal margin; distad of these a paired pad-like membrane with a transverse U-shaped strut from which arises a stout spine; laterally, a deep cleft; arising at apex of lower margin of this cleft a pair of processes which are dilated in their apical third and thence narrow to a short curved spine. Phallus with lateral dorsal margin hollowed, each limb terminating distally in a small leaf-like membranous lobe, a long strap-like process, distally pointed, arising from each side before apex.

Male: length, 7·7 mm.; tegmen, 9·8 mm.

Holotype ♂, Solomon Is.: Guadalcanal: Oreke, 700 ft., 14.xii.1934 (*R.A.L.*)

This species differs from all other described species in the shape of the male genitalia. In the type specimen each tegmen bears two broad and parallel fasciae of white wax, one from the basal cell to the apical margin, the other from the middle of the sutural margin of the clavus to the apical margin.

Lollius evadne sp. n. (Fig. 5, D–F.)

Testaceous-yellow, mottled fuscous: vertex and middle of pronotal and mesonotal discs uniformly testaceous, lateral angles of mesonotum narrowly fuscous, lateral pronotal fields lightly infuscate, but mostly testaceous; legs distinctly transversely banded fuscous and testaceous. Tegmina translucent, greenish testaceous; a large triangular area between base and humeral eminence, a short stripe at base of clavus and a broad vitta between M and Cu, beginning at middle of claval suture, dark fuscous; veins brown, costal vein yellow.

Male genitalia basically similar to those of *L. acis*, differing as follows: phallobase with basal part of dorsal margin subtriangularly produced, the concavity distad of this lobe broad, not narrow; the first pair of spines on the dorsal margin more sinuate, and each of the distal pair more asymmetrically dilated distally, and with apical spine directed dorsad. Phallus with apical pair of spines narrow and sinuate, but relatively broader in basal half. Genital styles with the indentation on posterior margin of apical process situated farther from apex than in *L. acis*.

Male: length, 8·0 mm., tegmen, 10·0 mm.

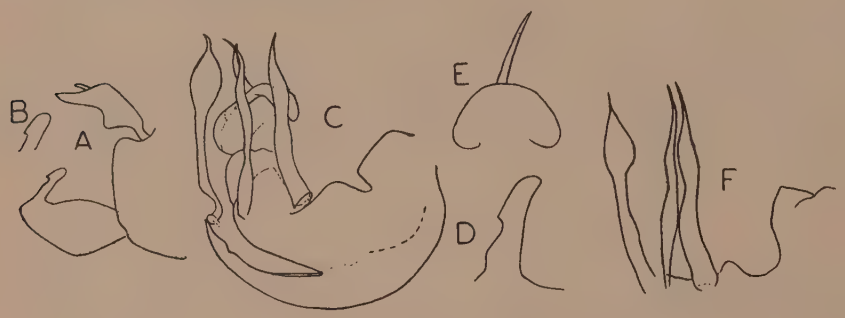


FIG. 5.—*Lollius acis* sp. n. A, Anal segment, pygofer and right genital style; B, distal part of apical process of genital style; C, aedeagus, right side. *Lollius evadne* sp. n.: D, distal part of apical process of genital style; E, median spine at apex of aedeagus, posterior view; F, upper margin and spines of aedeagus, right side (for comparison with C).

Holotype ♂, SOLOMON IS.: KOLOMBANGARA: Jack Harbour, Karikona Estate, 9.vi.1934 (*H. T. P.*).

The differences between this species and its nearest described relative, *L. acis*, are more numerous than given above. It is quite evident that both species have been derived from the same immigrant stock, but it is difficult to decide whether or not they should be treated as species or subspecies. The differences appear to the writer to be rather too numerous for *evadne* to be considered as merely a geographical subspecies.

Hemisphaerius Schaum.

Schaum, 1850, *Ersch. u. Grub. Enc.* **1**: 71. Haplotype, *Issus coccinelloides* Burm., 1833, *Mey. Reise Nov. Act.* **16**: 305, t. 41, fig. 11.

Hemisphaerius penumbrosus sp. n. (Fig. 6, A–F.)

Integument of dorsal surface polished, very finely granulate.

Piceous; a bar overlying frontoclypeal suture, vertex, pro and mesofemora except for a bar across middle and a stripe near apex, pro- and mesotibiae except for a longitudinal

stripe, and post-tibiae, yellow. Tegmina piceous in basal half, distal half and a broad zone along costal margin, yellow, the latter becoming orange at base.

Anal segment of male in dorsal view subtrapezoidal, only slightly longer than broad, widest at apex. Aedeagus tubular, U-shaped, dorsal margin produced at base in a strongly convex lobe ; dorsal surface strongly convex, submembranous, expanded distally in a pair of semicircular lobes ; a long narrow sclerotised plate expanded into a lobe distally, the expanded portion curved mesad and terminating in a point ; ventral surface of aedeagus

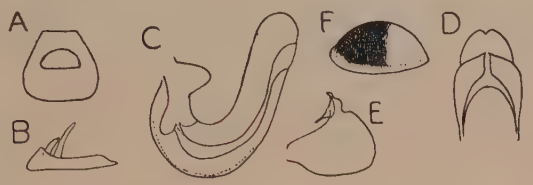


Fig. 6.—*Hemisphaerius penumbrosus* sp. n. A, Anal segment of male, dorsal view; B, ditto, lateral view ; C, aedeagus, left side ; D, apical part of aedeagus, ventral view ; E, genital style ; F, tegmen (freehand sketch).

scoop-like, distally deeply rounded. Genital styles broad, subtriangulate, apical process short, broad and bicuspidate.

Male : length, 4·1 mm. ; tegmen, 3·8 mm.

Holotype ♂, Solomon Is. : Santa Isabel : iii.1932 (*R. A. L.*).

This species differs from the type specimens of *H. plagiatus* Walker (Sula), *H. nigrolineatus* Walker (Morty), *H. tristis* Walker (Batchian) and *H. collaris* Walker (New Guinea) strongly in colour pattern. It is, at least superficially, closest to *H. concolor* Walker from New Guinea, but differs in the brighter and more definite band on the frontoclypeal suture and in the colour of the tegmina.

NEW CRAMBINE GENERA ALLIED TO *DIATRAEA* GUILDING (LEPIDOPTERA : PYRALIDAE).

I (SUPPLEMENTARY NOTE) AND II.

By Harold E. Box, F.R.E.S., and Hahn W. Capps,* F.R.E.S.

I (Supplementary Note).

Eodiatraea Box

Eodiatraea Box, 1953, *Proc. R. ent. Soc. Lond.* (B) **22** : 178.

In the description it is stated : " Second abdominal segment of male without lateral retractile processes (' hair-tufts ')." A slide-mount of the abdomen of a male *E. amazonica* (Box) in the United States National Museum, has been examined by one of us (H. W. C.), and the lateral retractile processes are found to be present on the second abdominal segment. The generic description therefore requires the reference to these organs to be deleted or alternatively to read " with or without."

Eodiatraea centrella (Möschler).

Chilocentrellus Möschler, 1883, *Verh. zool.-bot. Ges. Wien* **32** (1882) : 360, Pl. 18, fig. 45.

Diatraea canella Hampson, 1895, *Ann. Mag. nat. Hist.* (6) **16** : 349 (excl. ref. to Brazil) ; Kaye, 1901, *Trans. ent. Soc. Lond.* **1901** : 151 ; Dyar, 1911, *Ent. News* **22** : 202 ; Dyar and Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 20, fig. 13 (♂), fig. 60 (♀) ; Box, 1950, *J. N.Y. ent. Soc.* **58** : 243.

Diatraea anathericola Dyar and Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 21 [in part ; only the male genitalia misassociated with the adult lectotype (no. 29,430, in U.S. Nat. Mus.) from Sao Paulo, Brazil, and one female paratype (same number, in U.S. Nat. Mus.) from British Guiana].

Eodiatraea centrella (Möschler) Box, 1953, *Proc. R. ent. Soc. Lond.* (B) **22** : 178.

The genitalia on the slide labelled as belonging to the male type of *D. anathericola* are here shown in fig. 1, and it will be seen that they agree with those of typical *E. centrella* from British Guiana illustrated by Dyar and Heinrich, 1927 (as *D. canella*). We have compared this slide (or the drawings made from it) with specimens from British Guiana, Trinidad and Venezuela, and we find it to agree with this material, leaving no doubt as to its identity with *E. centrella*. The real provenance of these genitalia, which have been accidentally associated with a different moth (see our discussion of *Crambidiatraea cayennella* (Dyar and Heinrich) below) is unknown to us, but the locality cited (Sao Paulo, Brazil) is so far outside the range of *E. centrella* as to be unacceptable. Hampson included Brazil in the distribution when he described *D. canella*, and Kaye cited " Brazil : Castro, Parana " for the same species, but these records were later corrected by Dyar (1911 : 203). We know of no authentic records of the occurrence of this well-known and easily recognisable species in Brazil, though it almost certainly breeds in sugar-cane and wild grasses in the north of that country close to the frontiers with Venezuela and the Guianas.

* Entomology Research Branch, United States Department of Agriculture.

The female paratype of *D. anathericola* cited above appears to be a depauperate and faded specimen of *E. centrella*, with which its genitalia are found to agree, as stated by Dyar and Heinrich in their description of *anathericola*. It is one of a pair (the other being *Crambidiatraea cayennella*; see below) reared by H. W. B. Moore in 1915 at De Kinderen Plantation, British Guiana, from larvae boring in the grass, *Andropogon bicornis* L. (*Anatherum bicorne* Beauv.), which is a common wild host-plant of *E. centrella* in that country as well as in Venezuela and Trinidad. This illustrates the importance of adequate dissections of the type series to assure that it contains only one species and also that it cannot be presumed with safety that all of the material is conspecific even though reared from the same locality and food-plant.

Fig. 1.—*Eodiatraea centrella* (Möschler). Male genitalia. Drawn from the slide labelled as belonging to the type (no. 29,430, in the United States National Museum) of *Diatraea anathericola* Dyar and Heinrich [= *Crambidiatraea cayennella* (Dyar and Heinrich)] shown in Plate I, fig. 3.

II. New Genera.

Crambidiatraea gen. n.

Of medium size (expanse: males, 19·0–32·0 mm.; females, 17·5–36·0 mm.) with the fore wing (in fresh specimens) rather narrow; general aspect crambiform. Venation normally as in *Diatraea* Guilding (1828, *Trans. Soc. Encour. Arts* 46 : 148).[1] Ground-colour of fore wing whitish or light buff with the veins and interneural lines clothed with lines of darker scales giving a yellowish-buff, pinkish-buff, greyish or brownish appearance; not irrorate with individual fuscous scales (cf. *Eodiatraea* Box); diagonal "lines" composed of small groups of fuscous or brownish scales on and between the veins and forming the typical "*Diatraea* pattern," sometimes present (Plate I, fig. 4), more often vestigial (fig. 1, 3), or obsolete (fig. 2). Second abdominal segment of male with or without lateral

[1] Abnormal venation is known in one species, viz. *entreriana* Box (see Box, 1931, *Bull. ent. Res.* 22 : 10). In a few individuals (all females) vein 10 in the fore wing is united with veins 8 and 9 for some distance, instead of being free from the cell, as is usual in *Diatraea*.

retractile processes (" hair-tufts ") ; hind tibia of male without a prominent tuft but sometimes bearing long hair-like scales.

Male genitalia with the harpes narrow, bearing a heavily chitinised, more or less irregularly serrate, somewhat spatulate, recurved projection sub-basally, sometimes also with a recurved basal " hook " which may be smooth or serrate ; tegumen narrow, even, without lobes ; uncus and gnathos rather short, sharply pointed ; anellus with the outer arms long, slender, spiny (sometimes conspicuously) on their inner margins and with a slender median projection, the form of which varies in the different species.[2] *Female genitalia*[3] with the ductus short or moderately long, rather heavily chitinised, and produced beneath into a prominent rugose-striate cleft shield ; bursa of moderate size, partially chitinised at the neck, with or without a heavily chitinised ring at the base and sometimes with an internal median serrate "girdle." Genitalia of this type are figured by Dyar and Heinrich, 1927, and Box, 1931 (see systematic references, below).

Type-species : *Diatraea cayennella* Dyar and Heinrich.

The species transferred to this genus appear to be confined to the South American continent. The larva of one species is recorded, but all are presumed to live as borers in graminaceous plants ; none of them are known to feed in cultivated crops.

Crambidiatraea cayennella (Dyar and Heinrich) **comb. nov.**
(Plate I, figs. 1, 2, 3).

Diatraea cayennella Dyar and Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 27, fig. 24 (♂), fig. 65 (♀) (French Guiana : Cayenne) ; Box, 1931, *Bull. ent. Res.* **22** : 38, pl. 5, figs. 10, 11 (♀) ; 1935, *Bull. ent. Res.* **26** : 328 ; 1948, *Bol. Ent. venez.* **7** : 37.

Diatraea anathericola Dyar and Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 21 [in part only the adult lectotype (no. 29,430 in U.S. Nat. Mus.) from Sao Paulo, Brazil, mis-associated genitalia excluded ; and one female paratype (same number, in U.S. Nat. Mus.) from British Guiana] **syn. nov.** ; Box, 1931, *Bull. ent. Res.* **22** : 38 ; 1948, *Bol. Ent. venez.* **7** : 37.

Distribution.—British Guiana, French Guiana, Brazil. Brazilian specimens have been recorded from Sao Paulo, Santos and Castro (Parana). From British Guiana the known records are of moths reared from larvae boring the stalks of a grass, *Andropogon bicornis* L. (*Anatherum bicorne* Beauv.), first (1915) by H. W. B. Moore at De Kinderen Plantation near the mouth of the River Demerara (Dyar and Heinrich, 1927 : 21) and later (1933) by J. G. Myers on the Rupununi savannahs in the interior (Myers, 1935, *Bull. ent. Res.* **26** : 340). Myers sent a reared female (now in the British Museum) to one of us (Box, 1935, *l.c.*), but it is believed that his brief description of the larva, which he " did not recognize as *Diatraea*," actually refers to another Pyralid (*Rupela* sp.) which is known to occur in the same habitat. It is noteworthy that both Moore's and Myers' larvae of *cayennella* in *Andropogon bicornis* were found in association with those of *Eodiatraea centrella* (Möschler), though from widely separated localities in British Guiana.

The ground-colour of the fore wings varies from whitish to buff, with the scales lining the veins and interneural spaces varying from pale pinkish-buff to

[2] This type of anellus is also present in *Diatraea bellifactella* Dyar, but in all other respects the male genitalia of this species are distinctive.

[3] The female of one species, viz. *castrensis* (Dyar and Heinrich) is not known. The genitalic characters here given are therefore based upon the other three species placed in *Crambidiatraea* gen. n.

brownish ; the diagonal rows of fuscous scales forming the " *Diatraea* pattern " are generally obsolete or very faintly indicated, but some specimens have been seen with this pattern as pronounced as in that of *C. castrensis* (Plate I, fig. 4). The present species closely resembles the Brazilian *C. strigipennella* (Dyar) (but see the discussion by Box, 1931 : 38–39).

Our inclusion of *Diatraea anthericola* Dyar and Heinrich in the synonymy requires explanation.[4] By the original description, where it is stated that the genitalia (male and female) are " as in *canella*," this species would be referable to *Eodiatraea* Box. Careful study of the known material, which consists of three specimens in the United States National Museum, however, causes us to conclude that *D. anthericola* is no more than a synthetic " species," composed as follows :

*Specimen No.*1.—Male type ; from Sao Paulo, Brazil.

The genitalia (fig. 1) attributed to this specimen correspond to *Eodiatraea centrella* (Möschler) and to no other known species. The moth itself (Plate I, fig. 3), which we here designate the lectotype of *anathericola* Dyar and Heinrich, is identified as *cayennella*, our opinion being strengthened by the fact that one of the female paratypes of *anathericola* (Specimen No. 3, below) also proves to be *cayennella*.

Specimen No. 2.—Female paratype ; from De Kinderen Plantation, British Guiana.

This is identified as a depauperate and faded specimen of *Eodiatraea centrella* (Möschler) (*Diatraea canella* Hampson) and its genitalia, which were dissected and examined by Heinrich and referred to in the description of *anathericola*, correspond with that species (see p. 175). The moth, which is in very poor condition, superficially resembles the other paratype (Specimen No. 3, below), reared from the same host-plant at the same time, but on careful examination of the fore wing at the correct angle some of the scattered fuscous scales can be detected ; such scales are not present in *cayennella*.

Specimen No. 3.—Female paratype ; same data as No. 2.

The moth corresponds with *cayennella* and its genitalia (which have now been dissected and examined) agree in every way with the figures cited for that species.

Crambidiatraea strigipennella (Dyar) **comb. nov.**

Diatraea strigipennella Dyar, 1911, *Ent. News* **22** : 206 (Brazil : Castro, Parana) ; Dyar and Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 27, fig. 23 (♂), fig. 66 (♀) ; Box, 1931, *Bull. ent. Res.* **22** : 38, pl. 4, fig. 1 (♀) ; 1948, *Bol. Ent. venez.* **7** : 35 ; 1948, *Rev. Ent. Rio de J.* **19** : 420.

Distribution.—Brazil. Recorded from Ourem (Maranhao) and Castro (Parana), so that the species is evidently widely distributed in Brazil.

C. strigipennella is very similar to *cayennella* in coloration and general aspect, but the genitalia of both sexes are distinctive in each of these species ; see, however, the discussion by Box (1931, *l.c.*).

[4] We have been made aware that the name *anathericola* actually has page precedence over *cayennella* in Dyar and Heinrich, 1927, but the present situation is covered and our selection of epithet justified by Article 28 of the Copenhagen decisions of the International Commission, 1953.

Crambidiatraea castrensis (Dyar and Heinrich) **comb. nov.** (Plate I, fig. 4).

Diatraea castrensis Dyar and Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 28, fig. 25 (♂) (Brazil : Castro, Parana) ; Box, 1931, *Bull. ent. Res.* **22** : 35 ; 1948, *Bol. Ent. venez.* **7** : 37.

Distribution.—Brazil.

This species is still known only by the unique male type (here illustrated) in the United States National Museum.

Crambidiatraea entreriana (Box) **comb. nov.**

Diatraea entreriana Box, 1931, *Bull. ent. Res.* **22** : 39, pl. 1, figs. 11, 12, 13 (♂), pl. 4, fig. 2—(♀) (Argentina : La Soledad, Entre Rios) ; 1948, *Bol. Ent. venez.* **7** : 39.[5]

Distribution.—Argentina : Entre Rios Province.

As stated in the description, this is a rather small species which looks like a pale *Crambus*.

Acknowledgments.

We are greatly obliged to Mr. Arthur D. Cushman, Scientific Illustrator, Entomology Research Branch, for the accurate drawings shown in figure 1, and to Mr. Aldo A. Carano, Photographer, Office of Information, United States Department of Agriculture, for the fine photographs reproduced in Plate I. One of us (H. E. B.) is also deeply indebted to Dr. Remington Kellogg, Director of the United States National Museum, for very kindly sending important material on loan to him in Trinidad, and for permission to make dissections of genitalia where necessary. Mr. R. G. Fennah, of the Imperial College of Tropical Agriculture, Trinidad, and Mr. Curtis Sabrosky, of the Research Branch, U.S. Department of Agriculture, have given valuable advice on problems concerning nomenclature. The above named gentlemen are asked to accept our sincere thanks for their kind co-operation.

[5] The type has been in the British Museum since the incorporation of the Tring Museum collections. Paratypes are in the United States National Museum.

PLATE I.

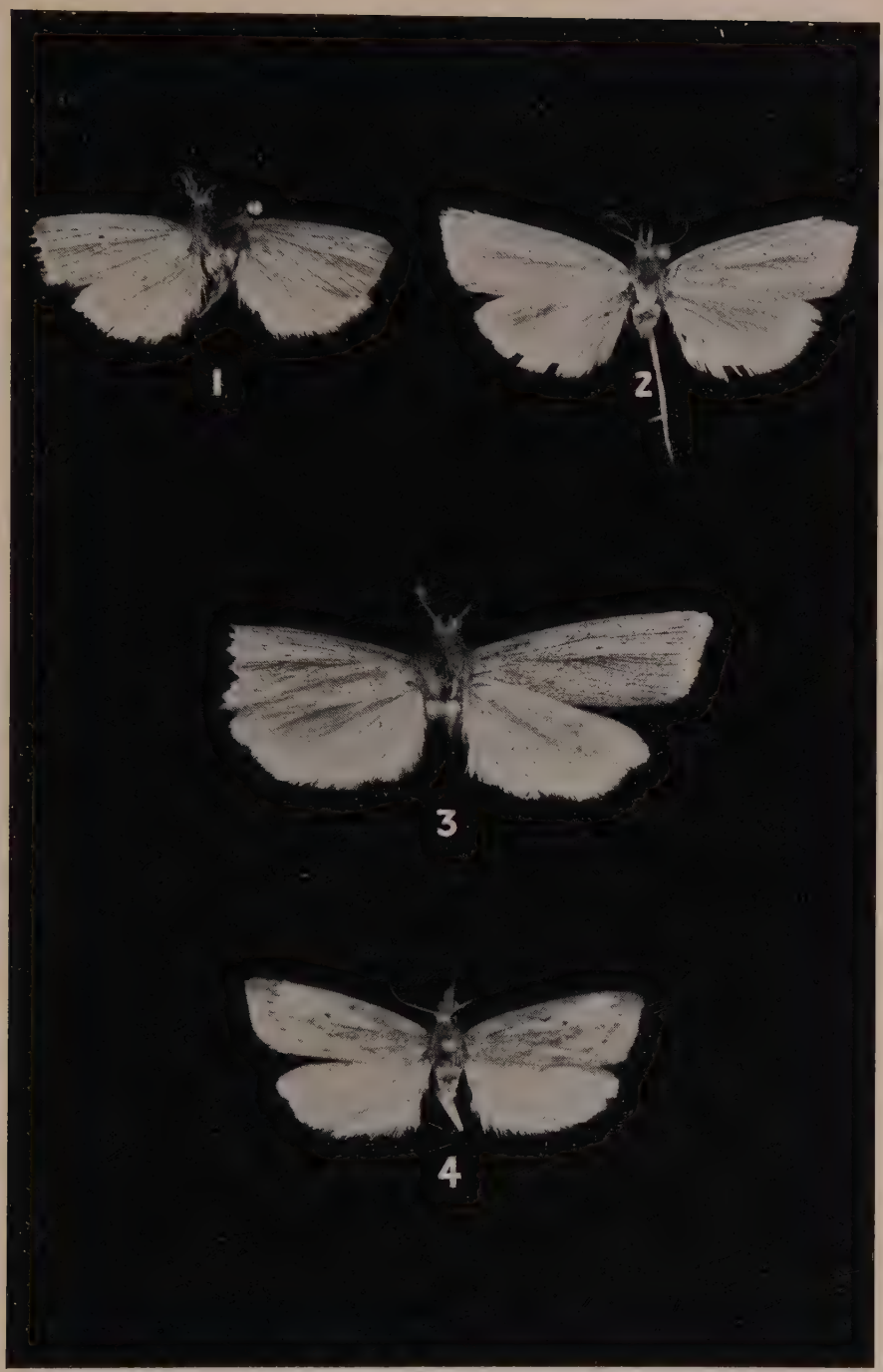
Types (× 2) of *Diatraea* in the United States National Museum.

Fig. 1.—*D. cayennella* Dyar and Heinrich. Male type, no. 29,433 A. [= *Crambidiatraea cayennella* (Dyar and Heinrich).]

Fig. 2.—*D. cayennella* Dyar and Heinrich. Female paratype, no. 29,433. [= *Crambidiatraea cayennella* (Dyar and Heinrich).]

Fig. 3.—*D. anathericola* Dyar and Heinrich. Male lectotype, no. 29,430. [= *Crambidiatraea cayennella* (Dyar and Heinrich).] The genitalia erroneously attributed to this moth are shown in text-fig. 1.

Fig. 4.—*D. castrensis* Dyar and Heinrich. Male type, no. 29,434. [= *Crambidiatraea castrensis* (Dyar and Heinrich).]



Types (× 2) of *Diatraea* in the United States National Museum.

H. E. Box and H. W. Capps.

Adlard & Son, Ltd., Dorking.

ON TWO NEW GENERA OF MORDELLIDAE (COLEOPTERA)*

By Mario E. Franciscolo, D.Sc., F.R.E.S.

Mordellopalpus gen. n.

Belongs to the subfamily Mordellinae, tribe Mordellini. General aspect typically mordelloid; form short, convex, robust; body noticeably dilated at the level of the

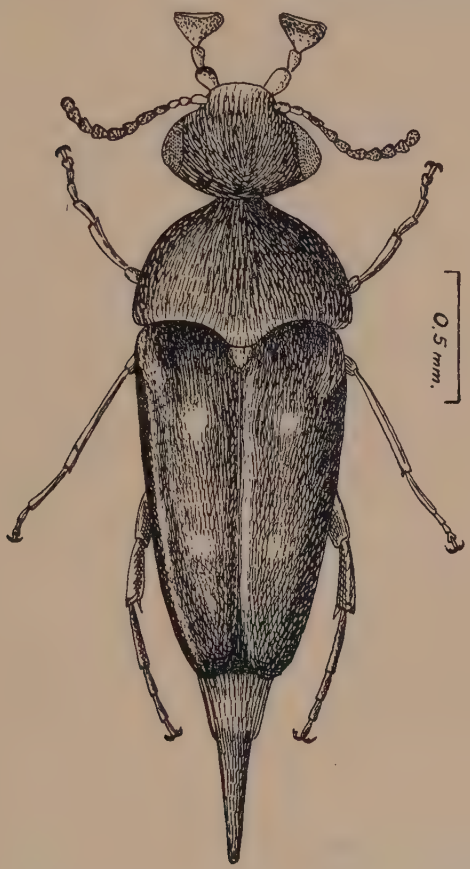


Fig. 1.—*Mordellopalpus antennarius* gen. et sp. n. Dorsal view.

base of pronotum (fig. 1). Head narrower than pronotum, wider than long. Temporal angle behind eyes narrowly obtuse. Temporal prominence feebly protruding in form of a very flat tooth. Frons normally convex. Occipital margin regularly arched, with no excavation at middle. Occipital lobe entirely missing. Tempora extremely thin. Mandibles normally elongate. Frontal surface regularly built up, with no concavities at middle. Maxillary palpus of male having different shape from that of female (figs. 2 (9–10):

* Contribution No. 31 to the knowledge of Mordellidae and Scraptiidae.

PROC. R. ENT. SOC. LOND. (B) 24. PTS. 9–10. (OCT., 1955).

fourth segment equilateral, triangular in male, scalene in female, in both sexes articulated to the third by one of its angles ; apical side of fourth segment, in both male and female, with a narrow papillar area occupying the whole length of that side. Antennae of medium length, dilated from fourth segment, feebly serrate from fourth to tenth segments ; eleventh segment complete (fig. 2 (1)). Eyes glabrous, finely granulated, of normal size and complete. Pronotum having normally lobate basal margin, with anterior lobe usually protruding forward, wider than long, with regularly arched sides without any pre-basal angle, and, seen laterally, with no pre-basal sinuosity at sides. Scutellum triangular, small, with sutural angle almost acute. Elytra without humeral elevation, having the periscutellar area normally flat, with no carination, with ground sculpture of the usual file type, separately rounded at apices. Epipleurae of elytra as wide at base as the metepisterna at that level ; metepisterna of mordelloid type. Pygidium conical, elongate, acute, produced beyond apex of elytra, regularly narrowed towards the apex. Anterior tarsi normal, with no appendages ; median tibiae barely longer than tarsi. Penultimate segment of anterior and middle tarsi emarginate ; that of middle tarsi almost bilobed (fig. 2 (2–3)). Posterior tibae bearing only one short preapical ridge, running parallel to the apical margin two spurs at apex of hind tibiae ; hind tarsi with no type of ridges.

Aedeagus : parameres strongly asymmetrical, the left one bearing a dorsal membraneous appendage (fig. 2 (5–6)). Eighth sternite as in fig. 2 (8), strongly bifurcated. Penis extremely long.

Type species : *Mordellopalpus antennarius* sp. n., from Buru Island, Sunda Archipelago.

From a strictly taxonomic standpoint *Mordellopalpus* can be easily inserted in the section of tropical genera of Mordellini having the antennal dilation starting from the fourth segment (namely : *Binaghia* Franciscolo from Fernando Po Island, *Stenomorda* Ermisch from the Belgian Congo, *Stenomordella* Ermisch from Fu-Kien, South China, and *Wittmerimorda* Franciscolo from Brazil). In *Paramordella* Pic the dilation starts from the sixth segment, whereas in all other genera it starts constantly from the fifth. All named genera are mono- or di-basic.

From a phylogenetic standpoint, the grouping of such genera in one particular section, simply on the basis of an antennal character, seems to be rather artificial and difficult to justify, in that only two of them, namely *Wittmerimorda* and *Mordellopalpus*, show a real affinity in all their characters. So far as other genera of this section are concerned, mainly *Mordellapygium* and *Binaghia*, there should in my opinion be other characters of much greater importance : for instance, *Mordellapygium* Ray has very pronounced affinity with *Pseudoconalia* Ermisch (type *Conalia de-beauxi* Franciscolo) whilst, on the other hand, *Binaghia* is certainly a less aberrant genus, which could with no difficulty at all be referred to the very uniform, little differentiated genera heading the section of *Mordella* L. Finally, *Stenomordella* Ermisch can in no way be referred to any of the other known genera on account of the quite unusual form of its maxillary palpi, of the pronotum and the greatly developed antennae in relation to the length of the insect.

I am therefore very doubtful that the character of the dilation of the antennae should be abandoned, at least as a character of first importance, because a series of substantially different genera, such as those mentioned above, can in no way be put into one and the same section in the classification of Mordellini. Unfortunately, in studying tropical genera of Mordellidae, which are all highly developed from a morphological standpoint, the dominant

trait is the duplication of fundamental, or considered as such, characters, passing from one section of genera to another. Thus, though it is fairly simple to prepare keys for the identification of genera merely from a taxonomic standpoint, it is extremely difficult to obtain satisfactory groupings which, from a phylogenetic point of view, can resist criticism.

It is therefore essential, to enable further progress in this field, to make a complete revision of the classification of the genera of Mordellini, though the present grouping of Ermisch is entirely satisfactory from the practical point of view.

As mentioned above, *Mordellopalpus* is closely allied to *Wittmerimorda*. In Ermisch's classification, amended in accordance with my 26th Contribution to the study of this family (1952, *Boll. Soc. ent. ital.* **82** : 70), it should be inserted as follows :

7 (...) Eyes glabrous ; segments 5–10 of antennae at the most one and a half times as long as wide, regularly dentate ; penultimate segment of anterior tarsi emarginate almost to half its length, that of middle tarsi largely incised to beyond the middle. Middle tibiae longer than middle tarsi.

8 (9) Fourth segment of maxillary palpi, in male and female, in form of a scalene triangle ; left paramere with no dorsal appendage ; dorsal appendage of right paramere heavily sclerotised ; eighth inner urosternum complete at apex. **Wittmerimorda** Franciscolo, 1952

9 (8) Fourth segment of maxillary palpi in male in form of equilateral triangle (fig. 2 (10)), in female scalene (fig. 2 (9)) ; left paramere bearing a membraneous dorsal appendage (fig. 2 (6)) ; dorsal appendage of right paramere extremely long, membraneous (fig. 2 (5)) ; eighth inner urosternum bifurcated at apex (fig. 2 (8)) **Mordellopalpus** gen. n.

Mordellopalpus antennarius sp. n.

Length (mm.) : head 0·45 ; pronotum 0·6 ; elytra 2·4 ; total 3·45 ; pygidium 0·75.

Breadth (mm.) : head 0·65 ; pronotum 0·8 ; elytra 0·75 ; pygidium 0·20.

Male.—Ground colour uniformly black, with some blue metallic sheen ; antennae dark brown, with the four basal segments testaceous ; maxillary palpi with segments 1–3 yellow-brown, the fourth dark brown, with paler margins ; labial palpi yellowish ; anterior margin of clypeus yellow-brown ; legs uniformly piceous-brown ; spurs of hind tibiae pale yellow.

General form as in fig. 1, moderately convex. Pubescence violaceous, dark, with some markings on scutellum and elytra, as shown in fig. 1, of golden-greyish pubescence.

Head transverse, one and a quarter times as wide as long, with ground sculpture dense and fine, consisting of subcircular and very minute punctures ; interstices completely glossy. Occipital margin, seen from above, forming a wide and regular curve ; seen from the occiput, straight, with a small concavity at middle ; temporal angle behind the eyes narrowly obtuse, briefly rounded at vertex ; the temporal edge extremely thin, and a little enlarged only near the vertex of temporal angle, with a small flat protuberance. Eyes subcircular, complete, finely granulated, glabrous.

Antennae (fig. 2 (1)) barely reaching middle of pronotum if folded backwards. Maxillary palpi as in figs. 2 (9) (♂) and 2 (10) (♀). Labial palpi normally formed, with the last segment small, subsecuriform.

Pronotum rather transverse, noticeably narrowed anteriorly, one and two-fifths times as wide as long, with ground sculpture of the usual file-type, little impressed ; interstices

entirely without shagreen. Anterior margin with a very wide and not very prominent median lobe; at sides a very fine margin which continues beyond the anterior angles, without becoming wider, and terminating immediately after them; anterior angles, seen laterally, almost square, shortly rounded at vertices; sides, seen laterally, almost straight; basal angles narrowly obtuse, widely rounded at vertices; basal lobe wide, prominent and truncate at apex.

Scutellum triangular, elongate, widely rounded at its posterior angle, covered by dense grey-whitish pubescence, which is clearly different from that of the surrounding surfaces.

Elytra one and two-thirds as long as their combined width at base; form and pubescent markings as in fig. 1; sculpture of the usual file type, densely impressed; interstices

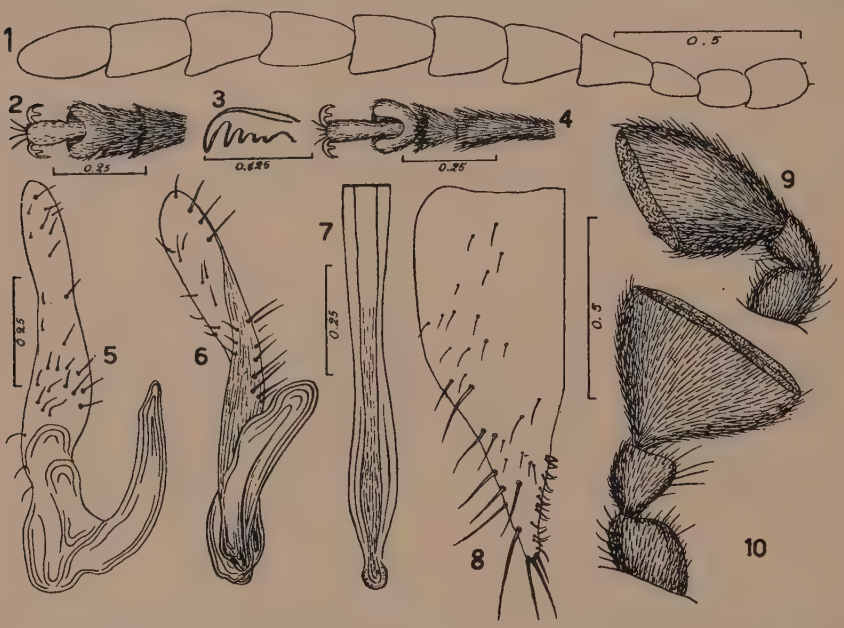


FIG. 2.—*Mordellopalpus antennarius* gen. et sp. n. (1) Right antenna; (2) anterior tarsus; (3) claw of hind tarsus; (4) middle tarsus; (5) right paramere; (6) left paramere; (7) apical half of penis; (8) dorsal view of eighth sternite (only one-half of it is represented); (9) maxillary palpus of female; (10) same of male.

without shagreen; seen laterally, they appear rather convex at shoulders, and the epipleural margin, behind their basal third, strongly concave; epipleurae thick, but rapidly decreasing in breadth, and completely obsolete at the level of the metacoxae.

Metepisterna wide anteriorly, abruptly narrowed backwards, with the metasternal suture strongly convex, and the metacoxal suture reduced to a very short line; they are covered by moderately dense golden-whitish pubescence.

Underside uniformly black, and covered by fine golden-whitish hairs; ground sculpture of the file type and no shagreen in the interstices.

Pygidium as in fig. 1, slender, acuminate, twice as long as the hypopygium, moderately sulcate at sides from base to its middle; basal third covered by golden-whitish pubescence, the remaining parts by black setae. Hypopygium unusually long, complete at apex.

Anterior legs with strongly arcuate tibiae (♂); tarsi as in fig. 2 (4); covered by golden-whitish pubescence as are the other two pairs; middle legs slender; tarsi as in fig. 2 (2); hind legs having tibiae with only a short pre-apical ridge, running entirely parallel to the

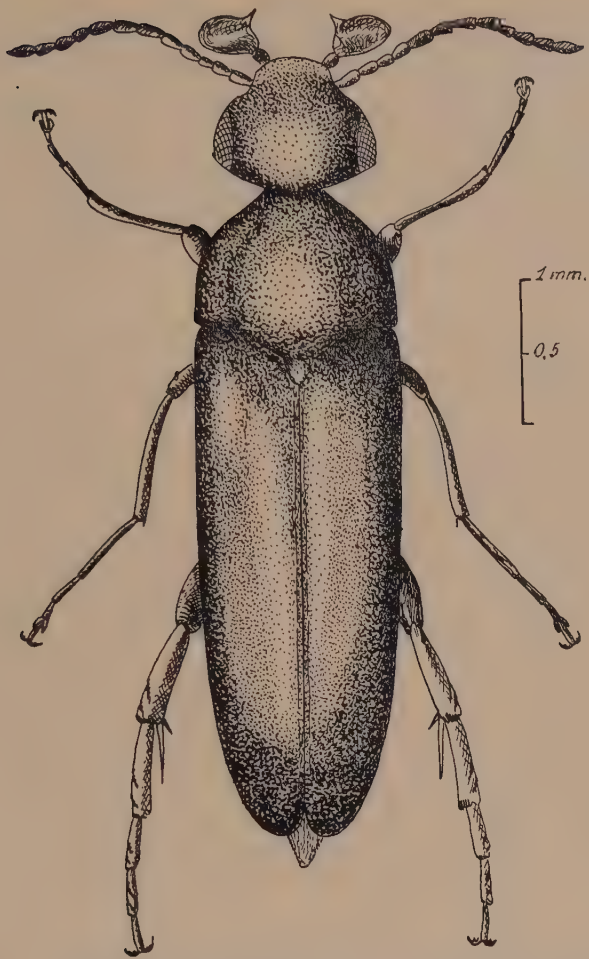


FIG. 3.—*Pselaphokentron bradypygum* gen. et sp.n. Dorsal view.

FIG. 4.—*Pselaphokentron bradypygum* gen. et sp.n. Lateral view (semi-diagrammatic).

very oblique apical margin; tarsi with no ridges at all; claws as in fig. 2 (3); spurs of tibiae yellow, the inner one one and a half times as long as the outer one.

Tarsal ratios: anterior 10 : 9 : 5 : 3 : 6; middle 20 : 5 : 4 : 4 : 6; posterior 50 : 23 : 18 : 17.

Parameres, penis and eighth sternite as in figs. 2 (5–8) respectively.

Female.—The only appreciable differences are in the form of the maxillary palpi (fig. 2 (9)) and anterior tibiae, which are almost entirely straight.

Holotype ♂, allotype ♀, 1 ♂ cotype, labelled SUNDA ARCHIPEL: Buru Island, Station 9, v.1921 (*T. J. Toxopeus*). ex coll. W. Wittmer. In author's collection.

Pselaphokentron gen. n.

Belongs to the subfamily Mordellinae, tribe Mordellistenini. General shape typically mordelloid; form elongate, parallel-sided, normally convex (figs. 3 and 4). Head a little narrower than pronotum, almost as long as wide. Temporal angle behind eyes widely obtuse. Frons normally convex, with no excavation at middle. Temporal edge, at level of temporal angle, little protruding outwards. Occipital margin complete, with no excavation at middle. Occipital lobe entirely obsolete. Tempora entirely absent. Mandibles normally developed. Maxillary palpi having the fourth segment in male of a quite unusual form (figs. 5 (6–7)), being of a nut-like appearance, and bearing at its inner side a very strong and acuminate spur-like process; a kind of gutter present along the lower margin of its anterior side; the papillary area very wide; in addition the upper surface of the segment bears a transverse carination. Labial palpi very unusual (fig. 5 (5)). Antennae as in fig. 5 (3). Base of pronotum regularly lobate, its anterior lobe normally produced. Pronotum wider than long, its sides without prebasal angle or sinuosity. Scutellum triangular, small. No carination on humera and on periscutellar areas of elytra. Ground sculpture of elytra of the file type. Apices of elytra separately rounded. Epipleurae narrower than metepisterna; of the usual mordellistenine shape. Pygidium rudimentary (figs. 3–4), barely surpassing apices of elytra, pointed at apex, not narrowed at middle, without lateral sulci. Anterior tarsi slender, without spiniform appendages; middle tibiae shorter than middle tarsi; penultimate segment of anterior and middle tarsi strongly incised up to the insertion on the third (fig. 5 (2)). Onychium normally developed. Hind legs as in fig. 5 (1); it should be noted that the upper lateral ridge of tibia runs so obliquely as to simulate a true dorsal ridge. Parameres strongly sclerotised, subsymmetrical (figs. 5 (9–10)); penis very long, straight, without any angulation at middle (fig. 5 (8)). Eighth sternite complete at apex, with only a very shallow emargination.

Type species: *Pselaphokentron bradypygum* sp. n. from Uganda.

This new genus presents three important characters, which are worthy of notice: (1) The form of the ultimate segment of the maxillary palpi, and particularly the presence of a robust spur protruding from its inner margin, does not allow any comparison with other known genera, unless one wishes to see a certain similarity with the appendages on the inner margin on the fourth segment of the maxillary palpi in the genus *Calyce* Champ.; the complicated patterns formed by the hollow edge running along the underside of the anterior margin, and the robust carina running transversely along the upper surface combine to make this organ more remarkable in *Pselaphokentron*; again, the abnormality also affects the labial palpi, the shape of which is entirely new in the Mordellistenini. (2) The atrophied pygidium is also new in the tribe, which repeats, in a certain manner, a pattern occurring very seldom in the Mordellini (*Xanthoconalia* Franciscolo, *Cothurus* Champ., *Phungia* Pic); it is true that in the Mordellistenini there are two other genera in which the pygidium assumes an unusually reduced size, namely *Mordelloxena* Franciscolo and

Tolidopalpus Ermisch. So far as the first genus is concerned the relative shortness of the pygidium is, in fact, more apparent than real, owing to the extreme elongation of the elytra, which amply cover the abdomen up to the apex of the pygidium ; in *Tolidopalpus* Ermisch the pygidium is in fact small, but it is still twice as long as the hypopygium ; there is, in fact, also a reduction in the size of the hypopygium, which is not the case in *Pselaphokentron*. (3) Against the above mentioned characters, which may be considered as definitely aberrant, we find in *Pselaphokentron* an absolutely normal genital apparatus, in that the elongation of the penis is normal, the eighth sternite (internal) is barely emarginate at the apex, and, what is more important, the parameres are extremely symmetrical. On the basis of an examination of the aedeagus of almost all genera of Mordellidae it can be stated that *Pselaphokentron* may be considered a slightly aberrant genus, but one which can be easily referred to the basic, more or less primitive *Mordellistena*-type.

The following modification of the key in Ermisch (1950, *Ent. Bl.* **45–46** : 40 ; further modified by him in 1952, *l.c.*, **47–48** : 144), should permit of identification of the new genus :

82 (77) Last segment of maxillary palpi of male never securiform, generally malleiform, sometimes in form of a nut ; in the females it is in all known cases securiform (this feature is uncertain for *Pselaphokentron*, the female of which is still unknown).

82A (82B) Last segment of maxillary palpi of male as in fig. 5 (6–7), in form of a nut, bearing on its inner side a very long and acuminate spur, having a rather wide base ; the upper surface of the segment transversely crossed along its outer side by a kind of elevated carina ; the lower part of the outer side bearing an excavated channel. Eyes finely granulated. Pygidium atrophied, barely surpassing the apex of elytra, in the type species only one and one-fifth times as long as the hypopygium. Type locality : Uganda
Pselaphokentron gen. n.

82B (82A) Last segment of maxillary palpi of male malleiform, more or less wide, sometimes squarish, bearing no spur or other type of appendage at its inner side, and no transverse carina or excavated channel as described above. Eyes coarsely or finely granulated. Pygidium normally developed, though in some instances the complex pygidium-hypopygium may appear very small ; in these latter instances, however, the pygidium at least twice as long as the hypopygium.

83 (84) Last segment of maxillary palpi of male malleiform, with more or less excavated outer margin, attached to the penultimate at one of its extremities.

83A (83B) Eyes finely granulated. Last segment of maxillary palpi of male small, malleiform. Antennae short, segments 5–10 almost squarish, or a little wider than long. Pygidium unusually short. Type locality : Fu-Kien **Tolidopalpus** Ermisch, 1951

83B (83A) Eyes coarsely granulated. Last segment of maxillary palpi of male large, malleiform, emarginate at apex, with apical side deeply arcuate. Antennae short, segments 5–10 a little longer than wide. Pygidium of normal size. Type locality : Guatemala, Brazil . . . . . **Pseudotolida** Ermisch, 1949

84 (83) Last segment of maxillary palpi of male malleiform, almost subrectangular, with rounded angles, and attached to the penultimate just at the middle of its posterior side. Eyes coarsely granulate, and much larger than in all known species of *Glipostena* and *Glipostenoda*. Type locality : Fu-Kien
Mordellistenoda Ermisch, 1941

Pselaphokentron bradypygum sp. n.

Length (mm.) : head 1·1 ; pronotum 1·2 ; elytra 3·4 ; total 5·6 ; pygidium 0·8.
Breadth (mm.) : head 1·3 ; pronotum 1·6 ; elytra 1·6 ; pygidium 0·3.

General form as in figs. 3 and 4. Colour : head, pronotum, scutellum and elytra black, with some metallic blue sheen especially on head ; a very narrow margin on anteclypeus

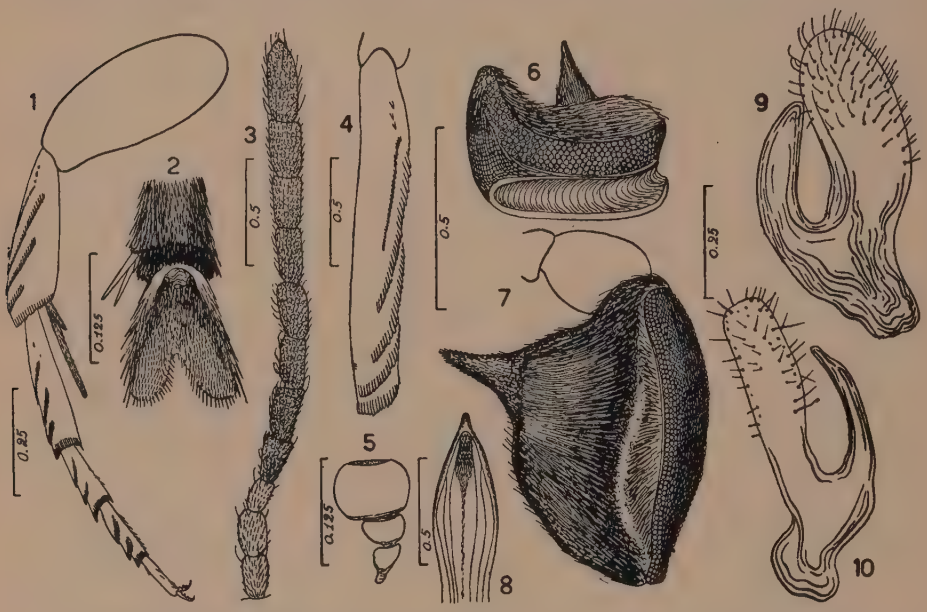


Fig. 5.—*Pselaphokentron bradypygum* gen. et sp. n. (1) Hind leg ; (2) apex of third and fourth anterior tarsal segment ; (3) antenna ; (4) dorsal view of hind tibia ; (5) labial palpus ; (6) last segment of maxillary palpus (♂) three-quarter view ; (7) dorsal view of same ; (8) apex of penis ; (9) right paramere ; (10) left paramere.

brown ; maxillary and labial palpi, and other buccal pieces, yellow-brown ; base of antennae yellow brown ; from fifth segment the antennae dark reddish-brown. All legs yellow, including spurs of hind tibiae, whereas all ridges on hind legs are black. Prosternum, mesosternum and anterior part of metasternum, and entire surface of metepisterna, dark brown, gradually paling to a very clear yellow-orange colour which covers the metacoxae and abdomen ; apex of hypopygium and pygidium, of a darker yellow colour. Pubescence uniformly pale golden-whitish on the black parts, definitely yellow-orange on the yellow parts ; only on apex of hypopygium and on upper surface of pygidium the hairs tend to be pale brown.

Head as in figs. 3 and 4 ; sculpture consisting of very small round punctures, little impressed, regularly spaced ; interstices without shagreen ; occipital margin, seen from the occiput, moderately convex ; the temporal edge, seen from the occiput, a little pro-

truding outwards. Eyes very finely granulated, sparsely but distinctly pubescent, complete, suboval. Tempora entirely absent. Antennae, maxillary and labial palpi as in figs. 5 (3, 5, 6, 7) respectively.

Pronotum : form and other details as in figs. 3 and 4. Ground sculpture of the file type, close and impressed, with interstices opaque due to a very dense and minute shagreen ; the margin beginning at sides of the median lobe extremely thin, and almost disappearing immediately behind the anterior angles. Basal lobe large, little produced, broadly truncate at apex.

Scutellum triangular, rather narrow at base, elongate, widely rounded at apex, heavily file-sculptured, covered by normally dense golden-whitish pubescence.

Elytra (figs. 3 and 4) densely file sculptured ; the sculpture extremely close, so that the surface appears almost undulate ; this appearance more evident owing to the extremely impressed and close shagreen.

For characters of the under surface see fig. 4.

Anterior and middle legs normally developed, with the penultimate segment of tarsi of both pairs deeply emarginate down to the articulation with the third (fig. 5 (2), anterior tarsus). Hind legs as in fig. 5 (1 and 4) ; the ridges on tibia and tarsus black.

Tarsal ratios : 13 : 7 : 5 : 4 : 6 ; 27 : 12 : 6 : 3 : 8 ; 33 : 17 : 16 : 13.

Aedeagus : penis long, almost half total length of body ; apex as in fig. 5 (8) ; parameres as in figs. 5 (9) (right) and 5 (10) (left), strongly sclerotised ; eighth sternite very large, normally covered by uniform and minute setae, with the apex feebly emarginated ; no vestige of suture along the medial line.

Holotype ♂, labelled UGANDA : Kalingu Forest, x.1948 (*T. H. E. Jackson*). In the British Museum (Natural History).

Book Notice.

Biology of Deserts. The Proceedings of a Symposium on the biology of hot and cold deserts, organized by the Institute of Biology. Edited by J. L. Cloudsley-Thompson. 8vo. London (Institute of Biology). 1954. Pp. iv + 224, tabs., text-figs. Price 14s.

This volume contains the papers read at a Symposium organised by the Institute of Biology. The Symposium consisted of six sessions devoted to various aspects of desert Biology as follow :

(1) Climate and Physical Environment. (2) Plant Ecology. (3) Entomology and Ecology. (4) Economic Aspects. (5 and 6). Mammalian Physiology and Ecology (1 and 2).

Twenty-eight papers are printed and the last six pages of the volume are devoted to abstracts of the discussions which took place at the end of each session.

CANTHYPORUS LATERALIS (BOHEMAN) AND FURTHER NEW DYTISCIDAE (COLEOPTERA) FROM THE CAPE PROVINCE OF SOUTH AFRICA.

By Joyce Omer-Cooper, B.A., F.R.E.S.
(*Rhodes University, Grahamstown, S. Africa.*)

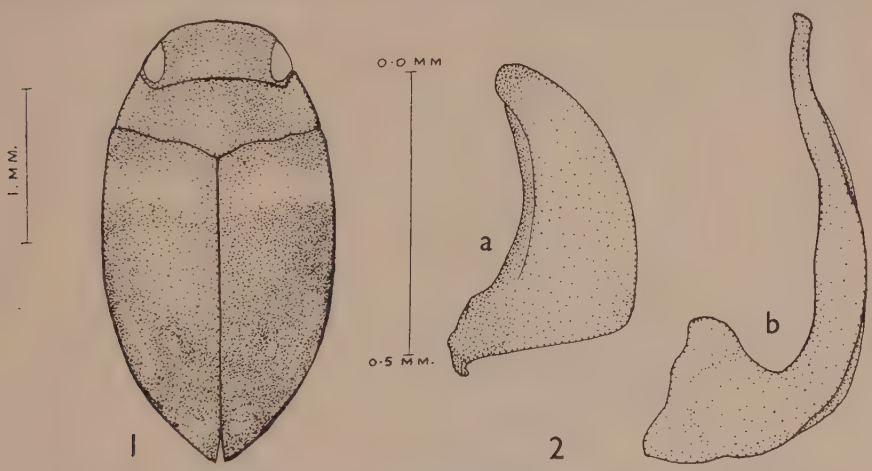
Canthyporus lateralis (Boheman). (Fig. 1.)

Hydroporus lateralis Boheman, 1848 : 255 ; Sharp, 1882 : 800 ; Régimbart, 1895 : 32.
Canthyporus lateralis (Boh.) Zimmermann, 1919 : 160.

This *Canthyporus* has not, I believe, been recorded since Boheman described it. It has the same coloration, i.e. black with the sides of pronotum and elytra lighter, the latter provided with an undulating post-basal band united with the margins, and a rather vague post-median spot, testaceous, as in *C. bicinctus* Régimbart. It is, however, smaller and the punctuation much finer. I have compared my specimens with Boheman's type and append, in amplification of the original, a full description.

Size.—2·6–2·8 mm.

Head.—Black with clypeus rufo-testaceous. Dull with a well impressed regular micro-reticulation. (In the type the head is a little more shining and the reticulation not quite so well impressed). Very finely punctured except in the shallow lateral impressions, where



Figs. 1, 2.—(1) *Canthyporus lateralis* Boheman. (2) (*a*) Paramere ; (*b*) median lobe of aedeagus (side view).

the punctures are coarser and closer, and with a row of well-impressed punctures parallel with the inner border of the eyes. Clypeus oblique at the sides and then gently rounded, slightly raised at the sides. Antennae with basal segments testaceous, a little clouded, the last seven segments brownish-black, slightly shorter and thicker than in *bicinctus* Régimbart.

Pronotum.—Black with the sides rufo-testaceous, dull with a well-impressed regular micro-reticulation. Finely punctured except for an irregular anterior row of large punctures and some irregularly placed basal punctures, smaller than the anterior ones but larger than the general fine punctuation. Two shallow lateral basal depressions present, which are punctured and wrinkled. Sides slightly rounded in front, then straight. Base wider than apex but very slightly narrower than the base of the elytra, whereas in *bicinctus* it is slightly wider.

Elytra.—Black with testaceous markings as shown in the figure. Rather dull, regularly and clearly micro-reticulate. Punctuation coarser than on the pronotum, but finer than in *bicinctus*. Serial rows, especially in the female, less evident. Sides very gently rounded with the apex less narrow than in *bicinctus*.

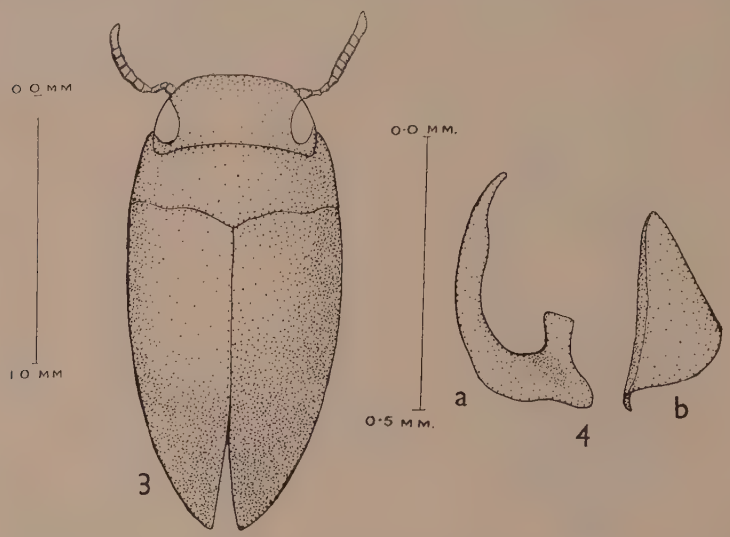
Underside.—Black with legs testaceous and epipleura clouded testaceous. Prosternal process rather coarsely, metasternum, metacoxae, abdominal segments and epipleurs, very finely, punctured.

Male.—Anterior tarsal segments slightly expanded, antennae a little thicker than in the female. Aedeagus as in figure 2.

Cape Peninsula: Kalk Bay Peak. 1 ♂, 3 ♀ "Rainwater pools in boulders" (*Harrison*).

Canthyporus parvus sp. n. (Fig. 3.)

Oval, rather narrowed behind, not very convex. Rufo-testaceous, the antennae lighter but with the apex of the segments, except the first three, clouded. Underside, including



Figs. 3, 4.—(3) *Canthyporus parvus* sp. n. (4) (*a*) Median lobe of aedeagus (side view); (*b*) paramere.

legs and epipleurs, testaceous. Both upper and underside reticulate. Pronotum finely and sparsely punctured. Elytra with coarse elongated punctures almost arranged in rows on the disc, becoming finer and more confused towards the apex and sides and almost disappearing at the shoulders.

Size.—1·75 mm.

Head.—Rather wide, especially in the male. Rufo-testaceous with clypeus a little lighter. Micro-reticulate and very finely and sparsely punctured, with two evident shallow lateral depressions. Antennae short and thick, segments 5-10 as broad as long, terminal segment longer.

Pronotum.—Rufo-testaceous with anterior border vaguely darker and sides lighter. Micro-reticulate, finely and sparsely punctured, with a row of rather coarser punctures parallel to the anterior border. Sides rounded in front then almost straight, strongly bordered. Base a little wider than the apex, sinuate.

Elytra.—Rufo-testaceous; almost parallel-sided for two-thirds of their length then rounded to the apex. Strongly micro-reticulate and strongly punctured with elongate punctures almost arranged in rows on the disc.

Underside.—Rufo-testaceous with legs and epipleurs a little lighter. Micro-reticulate with a longitudinal mesh, metacoxae impunctate. Abdominal segments finely and sparsely punctured.

Male.—Aedeagus as in fig. 4.

Female.—Head and pronotum a little more coarsely punctured and head a little less wide.

Holotype ♂, allotype ♀, West Cape Province: Caledon, 18.xi.1947 (*J. Omer-Cooper*).

This species is similar to *C. canthydroides* Régimbart, but smaller, and has no definite black markings on the pronotum. It is about the same size as *C. exilis* (Boheman) but lighter in colour and less oblong in shape. It is close to *C. laccophiloides* Omer-Cooper, but the antennae are thicker and the punctuation of the elytra coarser.

Tyndalhydrus capensis sp. n. (Fig. 5.)

This species is close to *T. coriaceous* Régimbart, having, like it, and in contrast to *T. caraboides* Régimbart, the prosternal process reaching the metasternum. Like *T. coriaceous* both the upper and under surfaces are testaceous

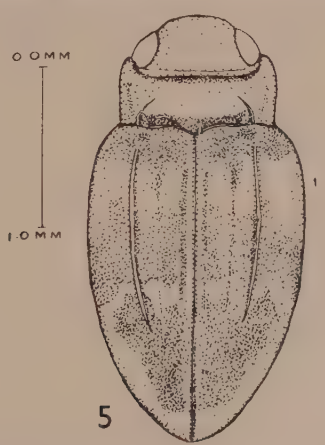


Fig. 5.—*Tyndalhydrus capensis* sp. n.

with somewhat vague black markings on the elytra, whilst the coarse, close punctuation has raised edges and the substrate is reticulate and wrinkled, giving, the upper surface particularly, a coriaceous appearance. The elytra

exhibit two very slightly raised keels, opposite but not quite continuous with the pronotal striae, and from about one quarter of its length from the pronotum to one third of its length from the apex, the sutural region is also raised. Apart from its coriaceous appearance it is difficult to find legitimate reasons for separating this species from *Yola*. In *Yola babaulti* Pesch. the punctuation approaches the coriaceous condition and it would seem that this new species is a transition species between the two genera. Neither *T. caraboides* nor *T. coriaceous* have elytral keels. In the former the prosternal process does not reach the metasternum, a character which is, perhaps, sufficient to separate it. If *coriaceous* and *capensis* sp. n. are to be retained within the genus there is need of a new definition. Unfortunately both my specimens of this new species are female and I should prefer the opportunity of examining a male before attempting this task.

Size.—2·7–2·8 mm.

Head.—Testaceous and closely punctured, reticulate. Clypeus rounded, whereas in the other two species it is clearly truncate in the middle and less clearly delimited at the sides. Antennae testaceous, distal segments clouded.

Pronotum.—Testaceous with two black spots at the base. Closely punctured, coriaceous and reticulate. Sides rounded in front, then straight to the base, which is narrower than the apex but very little narrower than the base of the elytra. Striae oblique, about half the length of the pronotum and with a well-marked basal depression internal to them. Between the striae stretches a transverse basal depression.

Elytra.—Testaceous with vague dark markings leaving, however, the sides, suture, an ante-median rather broad, and a post-median narrower, less clearly defined, undulating band, and the apex, testaceous. Each elytron with a slightly raised keel rising opposite the pronotal striae but not quite reaching the base of the elytra. At the base of the elytra, just internal to the base of the pronotal striae, is a depression. The keels descend gradually on the elytra ending at about two-thirds of their length. Sutural region raised from near the scutellary region for about the same distance. Sides rounded in front, making a well-marked pronotal angle, then almost parallel to a little beyond the middle, from whence they are gently rounded to the apex. Punctuation coarse and close, the elytra reticulate and wrinkled, giving a coriaceous appearance.

Underside.—Testaceous, coarsely but not so closely punctured as the elytra, reticulate. Prosternal process rather long and narrow, strongly bordered and punctured, ending in a little raised knob which reaches the metasternum.

Male.—Unknown.

Holotype ♀ and 1 ♀, W. Cape Province : Berg River, ii.x.1950 (*Harrison*).

Yola inopinata sp. n. (Fig. 6.)

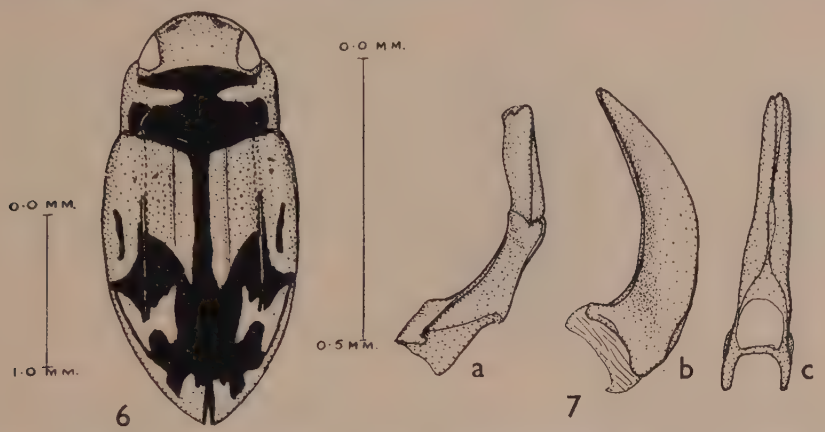
This *Yola* is evidently closely related to the species of the *Y. insignis* group. It has the same size, shape, type of colouring and the same incipient keels. It does not, however, fit properly into the sub-genus *Yolina* which Guignot has created for these species, since the serial punctures are obscured by the general coarse punctuation. It seems better for the present to abandon sub-generic nomenclature and refer instead to species groups.

Size.—2·75 mm.

Head.—Reddish-black, shining, obscurely reticulate, finely and rather sparsely punctured in front, more closely and coarsely behind and along the inner margins of the eyes. Hind border of clypeus distinctly raised at the sides and preceded by two well-marked,

shallow, rather wide, distinctly punctured depressions. Antennae testaceous with last segments clouded.

Pronotum.—Shining. Anterior and posterior border very broadly black, leaving, however, the margins and a narrow band interrupted by the black colour on the disc, testaceous. Punctuation coarse and close at the base with traces of reticulation within the punctures, a little finer on the disc and very fine at the sides anteriorly. From the punctures arise fine short hairs. Pronotal striae oblique, about half length of pronotum. A shallow transverse depression between the striae. Sides margined, rounded in front then straight. Posterior angles rounded and almost right-angled.



FIGS. 6, 7.—(6) *Yola inopinata* sp. n. (7) (*a*) Paramere (inside view); (*b*) median lobe (side view); (*c*) median lobe (dorsal view).

Elytra.—Testaceous with suture, base, and markings in the posterior two-thirds, as shown in the figure, black. The pronotal striae continued on the elytra as two very slightly raised keels, practically obsolete at the base and disappearing just beyond the middle; the course of the keels marked very obscurely by a line of punctures. Internal to this on each elytron, in the position of the first discal series in *Y. insignis*, is a second, even more slightly raised line and a row of punctures associated with it just discernible, in the anterior third. Apart from these very obscure serial rows the punctuation is coarse and close; a little finer and closer towards the apex and with some coarser punctures of the same size as those of the base of the pronotum in the scutellary region and outlining the base of the elytra. The usual fine punctures present along the suture. From the punctures, except the coarse basal and the fine sutural ones, as on the pronotum, arise short hairs. Sides contracted at the shoulders forming a clear pronotal-elytral angle, and then gently rounded to the apex. Widest and most convex behind the middle.

Underside.—Black with metasternal processes reddish, epipleurs and legs testaceous. Pro- and meta-sternum coarsely, metacoxae very coarsely punctured. Abdominal segments finely and sparsely punctured.

Male.—Aedeagus as in fig. 7.

Holotype ♂, WEST CAPE PROVINCE: Piquetberg, 23.vi.1952 (*C. Harrison*).

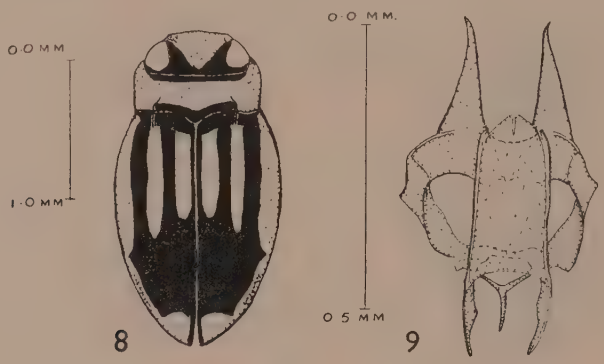
Guignotus harrisoni sp. n. (Fig. 8.)

Oval, not very convex, little narrowed in front or behind. Testaceous with head darkened posteriorly, pronotum anteriorly and posteriorly marked with black, and elytra with base, suture, and two lines united with the base and posteriorly with each other

and the suture, black. Shining, very obscurely micro-reticulate. Punctuation and pubescence fine and sparse. Underside pitchy with head, prosternal process, epipleurs, legs and first, and the apex of the last, abdominal segments, testaceous. Antennae testaceous.

Size.—2·2–2·4 mm.

Head.—Testaceous, reddish-brown behind, the brown extending forwards as a band with ill-defined limits along the inner margins of the eyes. Micro-reticulate and finely and sparsely punctured except just in front of the cervical band, where the punctuation is coarser and closer. Clypeus widely truncate, scarcely delimited from the frons. Antennae testaceous with the distal segments clouded.



FIGS. 8, 9.—(8) *Guignotus harrisoni* sp. n. (9) Aedeagus (dorsal view).

Pronotum.—Testaceous with anterior and posterior margin between the striae rather broadly brownish-black. Longer than in *G. aethiopicus*, microreticulate, sparsely pubescent and evidently but rather sparsely punctured on the disc, more finely on the sides, more closely, and slightly more coarsely, at the base between the striae, and with the usual row parallel to the anterior border. Sides rounded in front then almost straight to the base, posterior angles obtuse. Pronotal striae elbowed and rather short.

Elytra.—Widest just behind the shoulders; testaceous with suture, base, except the margins, and two rather broad lines coalescing behind the middle with the suture and each other, brownish-black. The apex, spaces between the lines, and margins testaceous, but an ante-apical brown spot lying in the testaceous margin.

Sutural striae commence only at a little distance from the base (about one-eighth of the elytral length) and the discal striae short. Pubescence and punctuation rather fine and not very close and micro-reticulation fine and rather obscure.

Underside.—Brownish-black with epipleurs, legs, head, prosternal process and first and apex of the last, abdominal segments testaceous. Micro-reticulate and finely but sparsely punctured except the first abdominal segment, which is outlined by large punctures as in *aethiopicus*.

Male.—Elytra a little more shining and less evidently reticulate than the female. Anterior and meso-tarsi with segments slightly dilated. Aedeagus as in fig. 9.

Holotype ♂, allotype ♀, 1 ♂, 3 ♀ paratypes, W. CAPE PROVINCE: Estuary of Klein River, 1.iii.1948 (*Harrison*). This species is very close to *G. aethiopicus* Régimbart and *G. milkoi* Omer-Cooper, having the same fundamental colour pattern and the same type of aedeagus, though the details of the parameres and median lobe are different from either. From the former, which it closely resembles, it may be distinguished by its slightly larger size, parti-

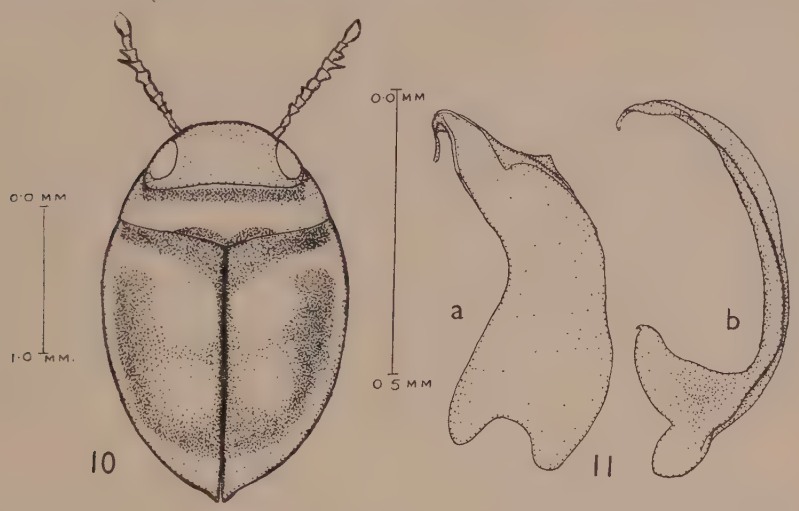
cularly in width, and the greater extension of the dark colour on the hinder part of the head, which extends forwards rather broadly along the inner border of the eyes. The reticulation of the head and pronotum is a little more evident in *harrisoni* and the punctuation a little less strong. The pronotal and elytral striae are shorter and the dark brown basal markings between the striae less extensive and less definite. The sutural striae commence a little further from the base than in *aethiopicus*.

G. milkoi is more robust than either and at once differentiated by its shining black head.

Hydrovatus brownei sp. n. (Fig. 10.)

This species is rufo-testaceous in colour (though I have one teneral specimen which is testaceous) with the elytra darker and marked obscurely with the usual two lighter spots on each elytron, the anterior being continuous with the lighter, anteriorly widened, border.

Widely oval, somewhat narrow behind, head rather wide. Punctuation on the head very fine and sparse, on the pronotum fine, especially on the disc, on the elytra medium, not very close on the disc, very fine at the sides and apex. Antennae testaceous and in



Figs. 10, 11.—(10) *Hydrovatus brownei* sp. n. (11) (*a*) Paramere (outside view); (*b*) median lobe (side view).

the male with segments 6 and 7 slightly flattened and segment 8 with its anterior external angle drawn out to a sharp point. External margins of segments 7 and 9 also drawn out to form smaller points. The end segment somewhat globose and obliquely truncate.

Size.—2·5–2·8 mm.

Head.—Shining, rufo-testaceous, rather wide, clearly and regularly micro-reticulate, finely and sparsely punctured. Clypeus finely bordered and gently rounded.

Pronotum.—Shining, testaceous with anterior border and posterior border in the middle brownish-black. Micro-reticulate, finely punctured on the disc and sides with two or three irregular rows of coarser punctures anteriorly and still coarser ones in the middle of the base. Sides straight.

Elytra.—Shining but obscurely micro-reticulate, brownish with the margins, apex and two spots on each elytron, the anterior continuous with the expanded side margin, testaceous. Punctuation medium, almost arranged in rows on the disc, becoming finer towards the sides and very fine in the apical third. Widest at the shoulders and most convex just behind them, sides gently rounded, elytral points short.

Underside.—Shining, rufo-testaceous, epipleurs and legs testaceous. Metasternum and metacoxae strongly punctured, not reticulate. Abdominal segments finely and sparsely punctured, except the first two, which are strongly punctured at the sides, transversely reticulate.

Male.—Prosternal process with a more or less circular depression. No metacoxal stridulating file. Aedeagus as in fig. 11.

Female.—Antennae regular. Punctuation on disc of pronotum a little more evident, on elytra a little less strong. Pronotal process without the circular depression. Form a little shorter and broader.

Holotype ♂, allotype ♀, 1 ♂, 2 ♀ paratypes, E. Cape Province: Albany District, Grahamstown. Bathurst Dist., Kleinemonde, 9.v.1954 (*J. Omer-Cooper*).

I have named this species after Mr. Balfour-Browne of the British Museum (Natural History) in gratitude for help received.

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NEW CRAMBINE GENERA ALLIED TO *DIATRAEA* GUILDING (LEPIDOPTERA : PYRALIDAE).—III.

By Harold E. Box, F.R.E.S., F.R.G.S.

Zeadiatraea gen. n.

General aspect suggestive of the Agrotid (Noctuid) genus *Leucania*. Fore wing rather broad ; venation as in *Diatraea* Guilding (1828, *Trans. Soc. Encour. Arts* **46** : 148) ; ground colour whitish or pale buff with the lines of scales on and between the veins forming contrasting stripes in shades of yellowish, orange or brownish (sometimes almost sepia) ; these lines comprising the only pattern except for the smallish blackish, fuscous or concolorous discocellular and terminal dots, which may sometimes be vestigial or absent.[1] Second abdominal segment of male without lateral retractile processes (" hair-tufts ") ; hind tibia of male without a prominent tuft of hair-like scales.

Male genitalia with the harpes rather broad, its upper (inner) margin smooth and even except for an inconspicuous basal setose prominence, otherwise devoid of projections ; tegumen broad apically, tapering to the base, without lobes ; uncus and gnathos rather long, beak-like, the gnathos sometimes prominently toothed ; anellus with a pair of long slender arms, each sharply pointed at apex, prominently toothed on inner margin near apex and sometimes also broadened and twisted sub-apically. *Female genitalia* with the genital opening small, narrow, with a narrow tapering chitinised papillose-striate area behind it, which sometimes continues to base of ovipositor ; ductus bursae short, with a narrow wrinkled rim ; bursa long, with an irregularly broad heavily chitinised ring at its base. Genitalia of this type are figured by Dyar and Heinrich, 1927 ; Box, 1931 (see systematic references below) and in fig. 1.

Type species : *Diatraea lineolata* (Walker) (*Leucania lineolata* Walker 1856).

The larvae are borers in graminaceous plants. Three of the species are recognised pests of maize or indian corn (*Zea mays L.*). Though the larvae are to some extent distinctive in each species, there appear to be no reliable characters by which they may be separated as a group from those of *Diatraea*.

Zeadiatraea lineolata (Walker) **comb. nov.**

Leucania lineolata Walker, 1856, *List Lep. Ins. Brit. Mus.* **9** : 100 (Venezuela).

Chilo culmicolellus Zeller, 1863, *Chilonid. et Crambid.* : 7 (Colombia) ; Walker, 1864, *List Lep. Ins. Brit. Mus.* **30** add. : 966 ; Zeller, 1877, *Horae Soc. ent. ross.* **13** : 14 (*Exot. Microlep.* : 12).

Chilo neuricellus Zeller, 1863, *Chilonid. et Crambid.* : 8 (Venezuela) ; Walker, 1864, *List Lep. Ins. Brit. Mus.* **30** add. : 966 ; Zeller, 1872, *Stettin. ent. Ztg.* **33** : 465 ; 1877, *Horae Soc. ent. ross.* **13** : 13 (*Exot. Microlep.* : 11).

Diatraea neuricella (Zeller) Zeller, 1881, *Horae Soc. ent. ross.* **16** : 162 ; Druce, 1896, *Biol. Centr.-Amer. Ins. Lep.-Het.* **2** : 295 [in part ; excl. refs. to Amazons, Santerem, Brazil, Argentine Republic[2] ; and excl. syn. *Crambus impersonatellus* Walker (= *Diatraea impersonatella* (Walker)], t. lxiv, f. 27 ; Pittier & Biolley, 1897, *Invert. Costa Rica* III, *Lep.-Het.* : 66.

[1] A rather similar pattern is seen in the fore wing of *Diatraea busckella*, including its subspecies, and in the *impersonatella-angustella* group, but the genitalia of these moths differ completely from those of the species here assigned to *Zeadiatraea* gen. n.

[2] The identity of the several species which Druce refers to *D. neuricella* (Zeller) is discussed by Box, 1949, *Rev. Ent. Rio de J.* **20** : 550–554.

Diatraea culmicolella (Zeller) Dyar, 1911, *Ent. News* **22** : 204.

Diatraea lineolata (Walker) Hampson, 1895, *Proc. zool. Soc. Lond.* **1895** : 953 [excl. syn. *Crambus impersonatellus* Walker (= *D. impersonatella* (Walker))] ; Pittier & Biolley, 1897, *Invert. Costa Rica* III *Lep.-Het.* : 66 ; Dyar, 1911, *Ent. News* **22** : 204 [excl. ref. to Arizona (= *Zediatraea grandiosella* (Dyar))] ; 1914, *Proc. U.S. nat. Mus.* **37**, no. 2050 : 319 ; [nec Barnes & McDunnough, 1917, *Check List Lep. Bor. Amer.* : 141 (= *Z. grandiosella* (Dyar))] ; Kaye & Lamont, 1927, *Mem. Dep. Agr. Trinidad & Tobago* **3** : 128 [excl. ref. to Argentina (= *D. impersonatella* (Walker (?))] ; Dyar & Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 24, f. 18 (♂), f. 63 (♀) ; Box, 1931, *Bull. ent. Res.* **22** : f. 1 (map), 45, pl. iv, f. 9 (♀) ; 1935, *Bull. ent. Res.* **26** : 330 ; 1948, *Bol. Ent. venez.* **7** : 33 ; 1948, *Rev. Ent. Rio de J.* **19** : 420 ; 1949, *Rev. Ent. Rio de J.* **20** : 541, f. 1 (map), 553 ; 1950, *J. N.Y. ent. Soc.* **58** : 242 ; 1951, *Bull. ent. Res.* **42** : 382.

" Neotropical Corn Stalk Borer ".

Distribution : Bahama Is., Cuba, Mexico, British Honduras, Guatemala, Costa Rica, Panama, Colombia, Ecuador, French Guiana, Netherlands Guiana, British Guiana, Venezuela (type locality : Maracay, Aragua State, designated by Box (1951, *l.c.*)), Trinidad, Tobago, Grenada.

This species, under the name *Diatraea lineolata* (Walker), has been confused in the economic literature with several others, viz. *grandiosella* Dyar, in U.S.A. (Arizona) and Mexico ; *impersonatella* (Walker), in British Guiana and Trinidad ; and *rosa* Heinrich, in Venezuela, as well as with *saccharalis* (Fabricius) elsewhere. With the exception of *grandiosella* in Arizona, these are all sugar-cane borers. The larva of *lineolata*, on the other hand, is a well known borer in maize, very rarely and then only accidentally feeding in sugar-cane. Other recorded food-plants of *Z. lineolata* are cultivated species of *Euchlaena*, *Sorghum*, *Tripsacum* and *Triticum*. The larva has not yet been discovered in any truly wild grass host (*see* Myers, J. G., 1935, *Bull. ent. Res.* **26** : 340–341). Numerous parasites of the larva are recorded in the literature.

Zeadiatraea grandiosella (Dyar) **comb. nov.**

Diatraea grandiosella Dyar, 1911, *Ent. News* **22** : 205 (Mexico : Guadalajara) ; Dyar & Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 25, f. 21 (♂), f. 68 (♀) ; Box, 1931, *Bull. ent. Res.* **22** : 44, pl. v, f. 16 (♀) ; Davis & Horton, 1933, *U.S. Dep. Agr. Tech. Bull.* **388** : 1–61, f. 9–16 (all stages) ; Box, 1935, *Bull. ent. Res.* **26** : 330 ; 1948, *Bol. Ent. venez.* **7** : 34 ; 1950, *J. N.Y. ent. Soc.* **58** : 243.

Diatraea lineolata Barnes & McDunnough, 1919, *Check List Lep. Bor. Amer.* : 141 [nec *Leucania lineolata* Walker (= *Zeadiatraea lineolata* (Walker))].

Distribution : U.S.A. (south-western States), Mexico.

The larva is primarily a pest of maize, in which food-plant the species has been spreading in recent years and now extends to Kansas and Oklahoma. In Mexico, *Z. grandiosella* has developed as an important pest of sugar-cane in the dry coastal belt of Sinaloa, but it also attacks maize there and as far south as Puebla and Veracruz. Sugar-cane has been reported as severely attacked in southern Texas.

This moth very closely resembles *lineolata* (Walker) and also *muellerella* (Dyar & Heinrich) (see below), both of which occur within its range in Mexico, though seldom in the same localities. *Z. grandiosella* has been confused with *lineolata* in Mexico, as well as with *Diatraea crambidoides* (Grote) (" larger corn stalk borer "), which ranges through the eastern U.S.A. from Long Island, N.Y.,

to Florida, and which has also been recorded from Kansas. Parasites in Mexico include species of Braconidae of the genera *Apanteles*, *Ipobracon* and *Agathis*, and the Tachinid, *Paratheresia claripalpis* (Wulp).

Zeadiatraea schausella (Dyar & Heinrich) **comb. nov.** (Fig. 1).

Diatraea neuricella Druce, 1896, *Biol Centr.-Amer. Ins. Lep.-Het.* **2** : 295 (in part) [nec *Chilo neuricellus* Zeller (= *Zeadiatraea lineolata* (Walker))].

Diatraea schausella Dyar & Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 24, f. 19 (♂). (Guatemala : Chejel) ; Box, 1931, *Bull. ent. Res.* **22** : 45 [in part ; excl. pl. iii, f. 6, and all references to the ♀ (= *Diatraea* sp. n.)] ; 1948, *Bol. Ent. venez.* **7** : 37 ; 1949, *Rev. Ent. Rio de J.* **20** : 554.

Distribution : Mexico (Veracruz State), Guatemala.

Until my recent investigations in Mexico this species was known only by the two males of the type series in the United States National Museum, and one male from the Godman-Salvin Expedition collection in the British Museum ; these are all from Guatemala. In July, 1952, numerous larvae and pupae were collected from a wild grass, *Setaria Poiretiana* (Schult.) Kunth, near Orizaba (Veracruz), from which a good series of moths was reared, including a number of females, previously unknown. These prove to be quite distinct, and with very different genitalia, from the female in the British Museum labelled " Colombia : Choco Prov., Condoto ", which I erroneously referred to *schausella* in my earlier revision of *Diatraea* (Box, 1931, *l.c.*), and which I now consider to represent a new species of *Diatraea*, probably belonging in the *rosa-busckella* group.

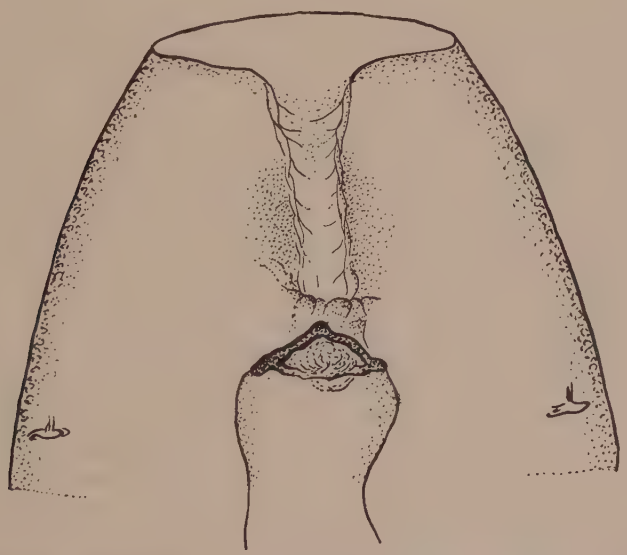


Fig. 1.—*Zeadiatraea schausella* (Dyar & Heinrich). Female Genitalia.[3] (Note that the apical four-fifths of the bursa are omitted from this figure, only the basal part being shown.)

[3] My thanks are due to Sr. Pietro Guagliumi, of Maracay, Venezuela, for very kindly making the original drawing for this figure.—H. E. B.

A description of the female of *schausella* now follows :

Female.—Larger than the male ; similar and with the colour pattern of the same intensity. Palpus cartridge buff above tinged with some brownish below. Antenna cartridge buff. Head and thorax cartridge buff with a narrow dark brownish median line ; tegulae warm brownish. Tergum light buff ; proximal two segments cinnamon or honey-colour ; terminal segments whitish. Pectus whitish to light buff. Legs cartridge buff, tinged with some brownish on the inside of femur and tibia. Fore wing with the ground colour light buff, the veins and interneural lines contrasting conspicuously in dark warm brownish (sometimes almost sepia), forming a well-defined pattern ; a light coloured streak beyond the cell, between veins 5 and 6 ; a dark warm brownish area along the basal two-thirds of the inner margin below vein 1 *c* ; a small blackish discocellular dot ; a terminal series of small blackish dots between the veins, from vein 2 to vein 8 ; cilia light buff to cartridge buff with some brownish scales intermixed. Hind wing uniformly light buff tinged with cartridge buff, with an ill-defined subterminal darkish line from vein 1 *c* to vein 7 tending to form dots between the veins. *Expanse* 38·0–42·0 mm. The genitalia are illustrated (**Fig. 1**).

Described from 10 specimens : Mexico, Veracruz : near Orizaba, alt. 980 metres ; reared from larvae boring stalks of *Setaria Poiretiana* (Schult.) Kunth, growing on a shady embankment on the edge of a small coffee plantation ; vii.1952 (*H. E. Box* and *S. Flores Cáceras*).

Z. schausella is one of the largest and most handsome moths of the *Diatraea* group. It is readily distinguished by the pronounced pattern of contrasting dark brown stripes in the fore wing and by the characteristic genitalia of both sexes.

Zeadiatraea muellerella (Dyar & Heinrich) **comb. nov.**

Diatraea muellerella Dyar & Heinrich, 1927, *Proc. U.S. nat. Mus.* **71**, no. 2691 : 25, f. 20 (♂) (Mexico : Guerrero) ; Box, 1931, *Bull. ent. Res.* **22** : 47, pl. iv, f. 8 (♀) ; 1948, *Bol. Ent. venez.* **7** : **37.**

Distribution : Mexico : Guerrero and Morelos States.

Previously known only by the male and female types in the United States National Museum, and one female from Cuernavaca (Morelos) (determination confirmed by C. Heinrich) in the British Museum, formerly in the Tring Museum. The species was re-discovered in Mexico during my visit in 1952, and the larva proves to be a pest of maize over a considerable area centred around Chilpancingo and Iguala (Guerrero) and Cuernavaca (Morelos) ; one larva was found in sugar-cane at Cocoyotla, near Cuernavaca. The altitude of these localities is from 750 to 1300 metres. The larva is attacked by the Tachinids, *Paratheresia claripalpis* (Wulp), *Palpozenillia palpalis* (Aldrich), and one other kindly determined by Dr. F. I. van Emden as *Gen. & sp. n.* near *Hypophylax* (Meigeniini).

Z. muellerella is extremely like *lineolata* and *grandiosella*, and no description based on colour pattern alone would serve to separate these moths with any degree of certainty ; the genitalia of both sexes, however, are distinctive in each species. In the British Museum specimen there is no trace of the discocellular and terminal dots in the fore wing, but in the series before me (8 ♂, 9 ♀) minute blackish (not concolorous) dots are present in some of the specimens.

A NEW FLEA FROM PALESTINE.

By F. G. A. M. Smit, F.R.E.S.

(*British Museum (Natural History), The Zoological Museum, Tring, Herts.*)

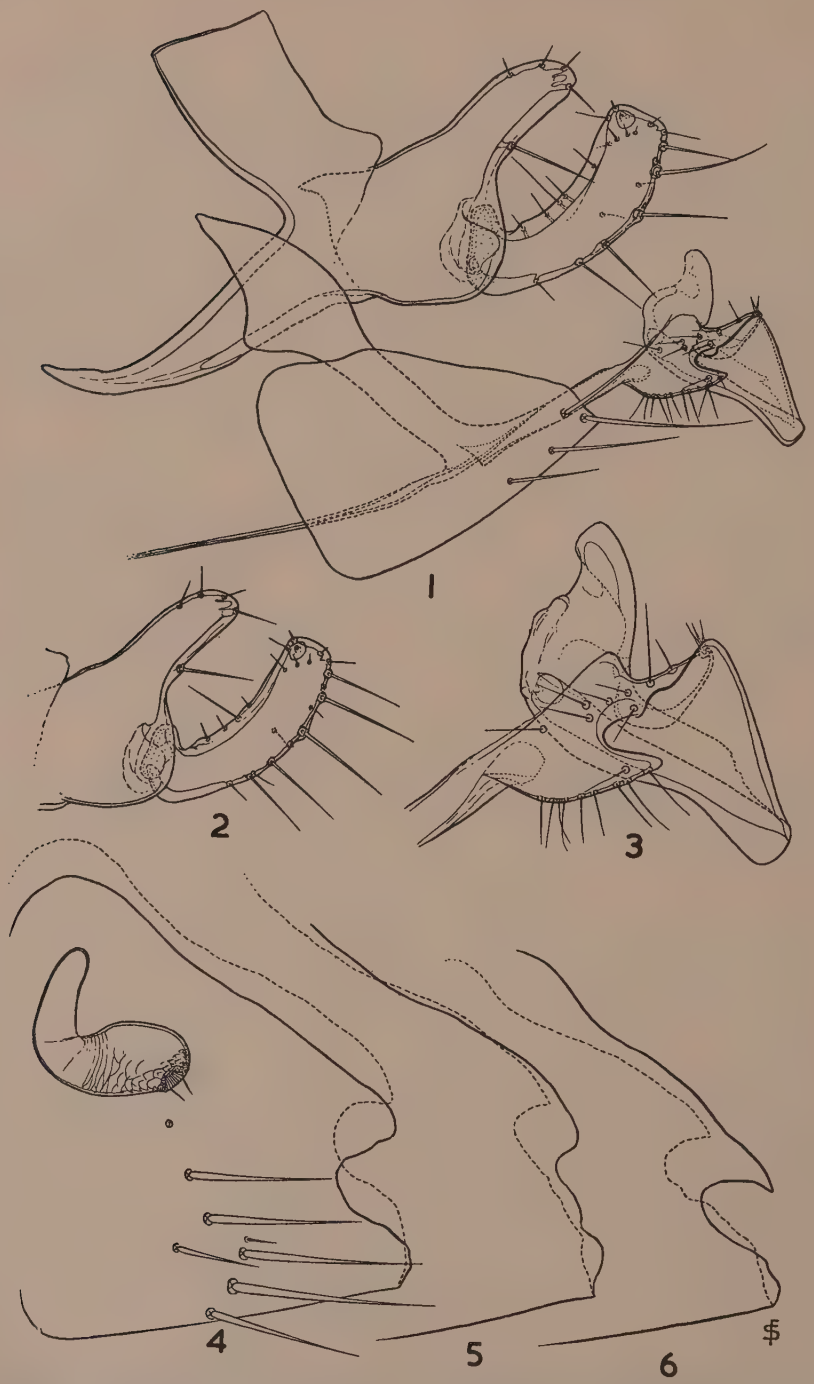
Prof. O. Theodor of the Department of Parasitology, Hebrew University, Jerusalem, kindly submitted to me for study a number of fleas which had been collected by Mr. M. Costa in Palestine. A new Leptopsylline flea from this collection is here described.

Leptopsylla algira costai subsp. n. (Figs. 1–6.)

Type material: Male holotype, female allotype and 1 ♂ 1 ♀ paratypes from Jerusalem, off *Mus musculus*, 18.i.54 (*M. Costa*): 1 ♀ paratype from Beth Alfa (about 7·5 km. west of Beisan, in the eastern plain of Esdraelon), off *Mus musculus*, 12.iv.53 (*M. Costa*). The paratypes have been returned to Professor Theodor, who generously presented the holotype and allotype to the British Museum collection of fleas at Tring. I have not seen the following specimens of the new subspecies, also collected by Mr. Costa, and of which Professor Theodor kindly supplied these data: Dunes south of Acre (= Akka), 9.iv.54, 1 ♀ off *Meriones shawi*; Mishmar Haemek (25 km. south-east of Haifa, in the foothills of the Gilboa mountains), 22.v.53, 1 ♀ off *Mus musculus*, and 7.xii.52, 1 ♀ off *Rattus rattus*; Beth Alfa, 12.iv.53, 1 ♀ off *Mus musculus*; Jerusalem, 28.iv.53 and 12.i.54, 3 ♂ 10 ♀ off *Mus musculus*; Aqua Bella (near Jerusalem), 19.i.54, 1 ♀ off *Mus musculus*. All hosts mentioned above, including *Mus musculus*, were collected in the field.

The new subspecies is nearest related to *Leptopsylla algira popovi* Wagner & Argyropulo (from Azerbaijan) and differs from it in the male by the more slender fixed process of the clasper and the very obtuse apex of the movable process; the female differs from *L. a. popovi* by having a deeper sinus in the posterior margin of sternum VII, while the lobe above the sinus is more sharply pointed.

Male (figs. 1–3): Fixed process of clasper slender, fingerlike. Movable process crescentic, of subequal width from base to apex, the latter being markedly truncate in the holotype (fig. 1), a little less so in the paratype (fig. 2); its posterior margin bears five long and slender setae, the upper one being subapical, in contrast with the upper of only four slender setae in *L. a. popovi*, which is placed much farther away from the apex. Sterna VIII and IX and aedeagal crochet (figs. 1, 3) very similar to those of *L. a. popovi* (fig. 7). In the figure of the modified segments of the latter subspecies in the paper by Wagner and Argyropulo (their fig. 5; here reproduced as fig. 7) the dorsal margin of the apical setose lobe of sternum IX is shown to be practically straight, but in the new subspecies and in both the North African subspecies (Smit, 1951, figs. 10, 11) the dorsal part of the lobe widens abruptly near its middle; therefore Wagner and Argyropulo's drawing is presumably incorrect in this point. Also, their figure of *L. a. popovi* shows the apical seta of the apical lobe of sternum IX as a normal seta, while in the other three subspecies this seta is bifurcate or, more often, trifurcate; the peculiar structure of this seta has probably been overlooked by these authors.



FIGS. 1–6.—*Leptopsylla algira costai* subsp. n. (1) Sternum VIII and segment IX of male holotype. (2) Clasper of paratype. (3) Apex of distal arm of sternum IX and aedeagal crochet of paratype. (4) Sternum VII and spermatheca of allotype. (5) Outline of sternum VII of female paratype from Jerusalem. (6) *Ibid.*, from Beth Alfa.

Female (figs. 4–6) : Posterior margin of sternum VII apparently normally with a fairly deep sinus (figs. 4, 6), the lobe above the sinus being usually acute, though sometimes rounded off (figs. 4, 5). The sinus in sternum VII of *L. a. popovi* (fig. 8) is shallow and the upper lobe more strongly rounded in the one specimen which Wagner and Argyropulo possessed.

Length : ♂ 2 mm., ♀ 2–2¼ mm.

Figs. 7, 8.—*Leptopsylla algira popovi* Wagner & Argyropulo. (7) Sternum VIII and segment IX of male. (8) Sternum VII of female. (Both figures after Wagner and Argyropulo, 1934.)

Remarks : The new subspecies is named in honour of Mr. M. Costa, who is the first to collect fleas extensively in Palestine and thus contributes very considerably to Siphonapterology. The new subspecies of *Leptopsylla algira* from Palestine forms a link between the two Algerian subspecies (*L. a. algira* and *L. a. tuggurtensis*) and the one in Azerbaijan (*L. a. popovi*). Let us hope that in due time specimens of *L. algira* from the regions between Algeria and Palestine, and from between Palestine and Azerbaijan will come to hand, for such material would help to complete the picture of the zoogeographically

interesting distribution of the known (and possibly still unknown) subspecies of *Leptopsylla algira*.

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Wagner, J., and Argyropulo, A., 1934, Aphanipterenfauna des Aserbeidschan (östlicher Teil Transkaukasiens) nebst Bemerkungen über die Gattung *Nosopsyllus* Jord. *Z. Parasitenk.* **7** : 217–232, figs. 1–11.

SUR QUELQUES PSÉLAPHIDES DE L'AFRIQUE ORIENTALE (COLEOPTERA).

Par le Dr. R. Jeannel, Hon. F.R.E.S.

En 1949 (*Mém. Mus. nat. Hist. nat., Paris*, **29** : 1–226) j'ai donné une étude des Psélaphides de l'Afrique orientale d'après les collections réunies en 1911–12 au cours du voyage de Ch. Alluaud et R. Jeannel, et celles de la Mission de l'Omo, en 1932–33. Tout récemment, Dr. W. J. Hall, Director du Commonwealth Institute of Entomology, m'a confié un lot de Psélaphides provenant de la Colonie du Kenya, de l'Uganda et du Soudan. J'ai trouvé dans ce lot un certain nombre d'espèces que je connaissais déjà, mais aussi quelques espèces nouvelles. La note présente énumèrera toutes celles qui m'ont été communiquées.

Dans cette énumération je me conforme à la nouvelle classification des Psélaphides en six sous-familles que j'ai établie dans un mémoire sur les Psélaphides de l'Afrique australe, en cours d'impression dans les *Mémoires du Muséum National d'Histoire Naturelle*, série Zoologie.

Subfam. Euplectitae Jeannel.

Pseudoplectus (*Hypoplectus*) *africanus* Raffray.

Raffray, 1913, *Voy. Alluaud Jeannel Afr. or.* : 22 (*Thesiastes*) ; type : Taveta.
Jeannel, 1949, *Mém. Mus. Hist. nat. Paris* **29** : 59.

Kenya Colony : Nairobi, 1 ex., xi.1920 (*A. F. J. Gedye*). Décrit de la forêt de Taveta (Jeannel, iv.1912).

Subfam. Batrisitae Jeannel.

Trabisonoma gen. n.

Genre différant de *Trabisus* Raffray et de tous les autres genres connus de la sous-tribu des Trabisina par la présence d'une grande apophyse capsulaire gauche sur l'édéage. Celui-ci a d'autre part une forme étroite et allongée, et se termine par une lame distale effilée, ce qui le distingue encore de tous les autres Trabisina.

Extérieurement l'aspect est celui des *Trabisus*. La massette palpaire est grande et pédonculée. Mais le pronotum présente un rétrécissement collaire bien plus long que chez les *Trabisus*, de sorte que la plus grande largeur des bosses latérales se trouve à peu près au milieu de la longueur du prothorax, alors qu'elle est toujours bien avant le milieu chez les *Trabisus* à rétrécissement collaire très court.

Type : *Trabisonoma gedyei* sp. n.

Trabisonoma gedyei sp. n. (Fig. 1.)

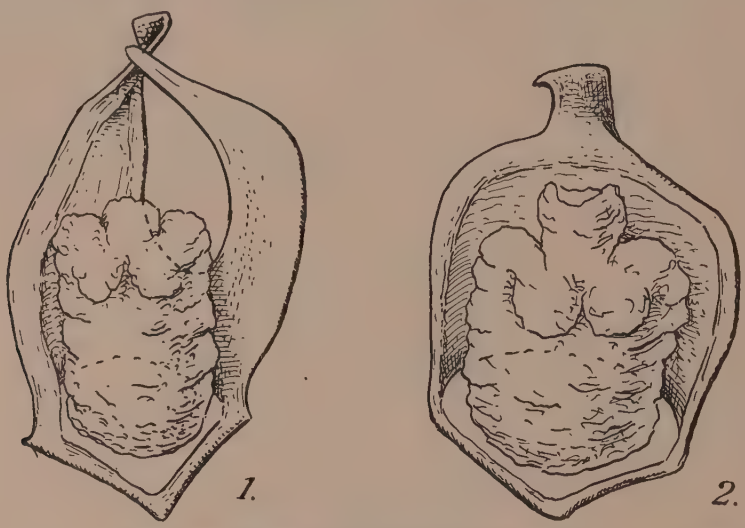
Long. 3·6 à 3·8 mm. Ailé. Aspect du *Trabisus giganteus* Raffray de l'Abyssinie (Jeannel, 1951, *Ann. Mag. nat. Hist.* (12) **4** : 236, fig. 9), dont il ne diffère guère, à première vue, que par la forme de son pronotum à rétrécissement collaire long. Tête semblable, le front déprimé, ponctué, avec deux vastes fossettes ocellaires séparées par une crête médiane entre les yeux, tempes arrondies et ciliées ; massette palpaire comme chez le *T. giganteus*.

Antennes plus grêles, la massue moins épaisse et plus déliée, les articles 9 et 10 pas plus longs que larges. Pronotum un peu plus long que large, de contour hexagonal, le sillon médian profond, la partie antérieure du disque non bombée, la fovéole basale grande, encadrée par quatre tubercules mousses et peu saillants. Elytres et abdomen comme chez le *T. giganteus* (*l.c.*, fig. 9).

Pas de différences sexuelles.

Edéage (fig. 1) allongé, le cadre basal s'atténue peu à peu en une lame distale aussi longue que lui, concave, puis tordue sur son axe pour finir en lame sagittale. Tout le bord gauche du cadre basal est occupé par une grande apophyse capsulaire comparable à celles des *Eleodomirus* ; large à la base, elle se rétrécit et se termine en pointe en s'incurvant. Sac interne membraneux et nu, comme chez tous les *Trabisina*.

Holotype ♂, Kenya Colony : Mont Kenya, à l'altitude de 8000 ft., xii.1934 (*A. F. J. Gedye*) ; 1 ♀ à l'altitude de 5350 ft., xii.1933 (*A. F. J. Gedye*) ; Nairobi, 1 ♀, xi.1920 (*A. F. J. Gedye*).



Figs. 1, 2.—(1) Edéage, face dorsale du *Trabisonoma gedyei* sp. n., du mont Kenya. × 90. (2) Edéage, face dorsale, du *Trabisus* (*Probatrisus*) *ugandanus* sp. n., de Mingiro forest. × 90.

Trabisus (Trabisidius) ugandanus, sp. n. (Fig. 2.)

Long. 3·2 mm. Ailé. Testacé rougeâtre, la pubescence longue et irrégulière. Tête un peu comme chez le *barbatus* Jeannel (1952, *Ann. Mus. Congo Belge* (Série 8°) (Zool.) **11** : 199, fig. 222), arrondie, avec le front régulièrement convexe, même en avant, vaguement ponctué ; les tempes convexes. Palpes à massette longue et incurvée, comme chez *barbatus*. Antennes courtes et épaisses, rappelant davantage les espèces de l'Abyssinie que celles de la Dorsale Congolaise ; articles 2 à 7 aussi longs que larges, le 8 plus court, un peu transverse ; articles 9 et 10 épaissis mais aussi longs que larges, le 11 atténué, deux fois aussi long que le 10. Pronotum un peu transverse, de même forme que celui du *temporalis* Jeannel, mais avec le sillon médian large et peu profond, lisse, les tubercules du disque très bas. Elytres et abdomen comme chez le *temporalis*, le premier tergite peu transverse et très étranglé à la base. Pattes robustes.

Chez le mâle le front présente un sillon transverse peu profond en avant du niveau du bord antérieur des yeux.

Edéage (fig. 2) à cadre basal plus large dans sa partie distale qu'à la base, son bord distal convexe, un peu plus saillant à droite qu'à gauche, l'apophyse distale près du milieu, un peu tordue sur son axe et terminée en forme de T. Sac interne membraneux et nu.

Espèce bien tranchée. Elle rappelle le *temporalis* par sa forme générale, mais en diffère par sa pubescence longue et irrégulière, la brièveté de ses antennes, l'absence de lobes postoculaires des tempes. Malgré celà son édéage est de même type.

Holotype ♂, Uganda : Mingiro forest, pris dans une galerie de termitière, x.1925 (*G. L. R. Hancock*).

Cliarthrus bicolor Raffray, 1877.

Jeannel, 1949, *Mém. Mus. Hist. nat. Paris* **29** : 140.

Kenya Colony : Athi Falls, 4 ex. dans du fumier d'Hippopotame, vii.1937 (*A. F. J. Gedye*).

Espèce répandue dans l'Afrique orientale et australe.

Batristites heterocerus Raffray, 1913.

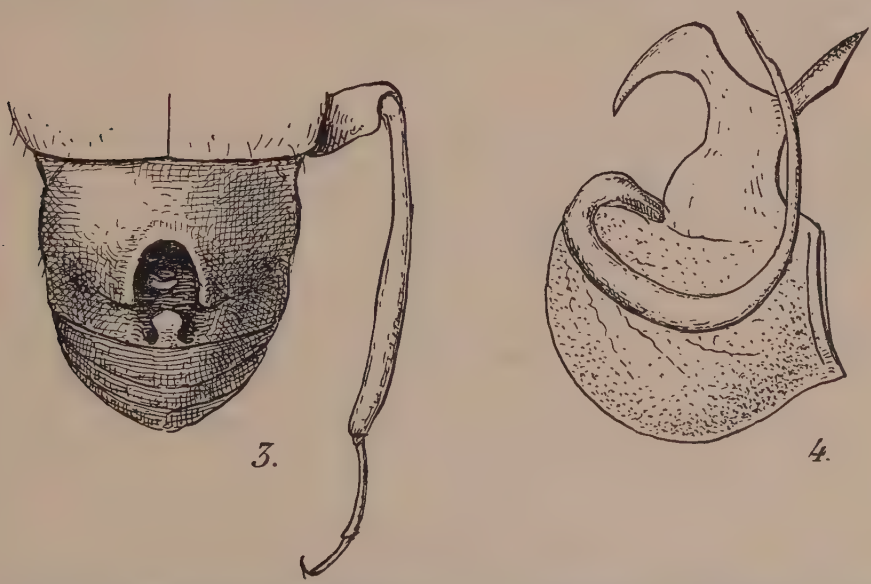
Jeannel, 1949, *Mém. Mus. Hist. nat. Paris* **29** : 137.

Kenya Colony : Nairobi, 1 ♂, xi.1920 (*A. F. J. Gedye*).

Décrit des forêts intérieures du Mont Kenya, à 2400 m. sur le versant occidental (*Jeannel*, i. 1912).

Arthromelus (s. str.) **uncinatus** sp. n. (Figs. 3–4.)

Long. 2·4 mm. Ailé. Testacé rougeâtre pâle uniforme, la pubescence rare. Grêle et délié. Tête à lobe frontal sans rebord antérieur, largement concave, avec un sillon



Figs. 3, 4.—*Arthromelus* (s. str.) *uncinatus*, sp. n., du Kawende. (3) Abdomen du mâle. (4) Edéage, face dorsale. × 105.

transverse à la base. Antennes peu longues, les articles 3, 5 et 7 pas tout à fait deux fois aussi longs que larges, les 4, 6 et 8 un peu plus courts ; articles 9 et 10 ovoïdes, une fois et demie aussi longs que larges. Pronotum à peu près aussi long que large, les bosses latérales saillantes et anguleuses, le bord antérieur particulièrement large, le sillon médian fin. Elytres aussi longs que larges, à épaules saillantes. Pattes grêles, les fémurs fusiformes.

Premier tergite abdominal (fig. 3) étroit, étranglé à la base, avec une profonde fosse médiane à bord arrondi, soulevé ; la fosse enferme une apophyse transverse et, en arrière d'elle, se dresse une deuxième apophyse lobée et très saillante ; faces latérales du tergite déprimées.

Tibias postérieurs des mâles à peine arqués mais épaissis dans leurs deux tiers distaux.

Edéage (fig. 4) remarquable par le fort crochet constitué par l'apophyse de la lame distale. Pièce mobile longue, ouverte en biseau à son extrémité.

Espèce bien différente de celles du Kenya. Par la forme de son lobe frontal, elle se rapproche de l'*elongatus* Raffray, de la grande forêt congolaise, mais avec les tubercules antennaires moins saillants.

Holotype ♂, Uganda : Kawanda, xi.1943 (*T. H. C. Taylor*).

Subfam. Bryaxitae Jeannel.

Ogmocerus burgeoni Jeannel.

Jeannel, 1950, *Ann. Mus. Congo Belge* (Ser. 8°) (Zool.) **2** : 65 ; type : Moto (Ituri).

Uganda : Namabile, 1 ♀, vi.1929 (*G. L. R. Hancock*).

Répandu au pied de la Dorsale Congolaise et sur le Mont Hoyo. N. Leleup l'avait déjà trouvé dans l'Uganda, aux environs de Jinja.

Ipsimodes itombwanus Jeannel.

Jeannel, 1952, *Ann. Mus. Congo Belge* (Ser. 8°) (Zool.) **11** : 175 ; type : Mboko (Kivu).

Uganda : Kampala, 1 ♂, x.1927 (*H. Hargreaves*).

Bryaxis circumflexa Raffray, 1882.

Jeannel, 1949, *Mém. Mus. Hist. nat. Paris* **29** : 87.

Kenya Colony : Nairobi (*A. F. J. Gedye*) ; Kabete, xii.1938 (*Maclones*) ; Chyulu Hills, alt. 5600 ft. (*Coryndon Museum*).

Répandu dans toute l'Afrique intertropicale.

Baxyris antennata Jeannel.

Jeannel, 1952, *Parc nat. Upemba, Miss. de Witte* **13** : 40. 1953, *Ann. Mus. Congo Belge* (Sér. 8°) (*Zool.*) **20** : 159.

Uganda : Kampala, alt. 3650 ft., 3 ♀ (*A. F. J. Gedye*).

Espèce répandue le long de la Dorsale Congolaise.

Trissemus (s. str.) **kinangopinus** sp. n. (Fig. 5.)

Long. 2 mm. Ailé. Testacé rougeâtre luisant, la pubescence fine et rare. Très convexe. Tête déliée, allongée, les yeux saillants, un peu plus longs que les tempes qui sont longues et bombées en arrière ; lobe frontal saillant. Antennes longues et grêles,

les articles du funicule deux fois et demie à trois fois aussi longs que larges, la massue très effilée, l'article 8 très petit, le 9 à peine épaissi, un peu plus long que large, le 10 plus grand et un peu aplati, le 11 elliptique deux fois aussi long que le 10. Pronotum à peine plus large que long, lisse, sans ponctuation, sa partie collaire longue et atténuée. Arrière-corps très renflé, les élytres très bombés, à ponctuation très fine et superficielle, à peine discernable. Carénules basales du premier tergite très rapprochées l'une de l'autre, longues et obliques, séparées à la base du sixième de la largeur du disque du tergite. Pattes longues et robustes, les fémurs épais, surtout les antérieurs.

Pas de différences sexuelles.

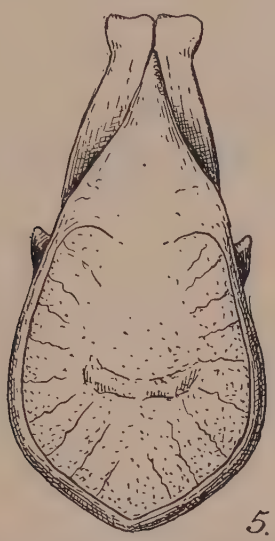


Fig. 5.—Edéage, face dorsale, du *Trissemus* (s. str.) *kinangopinus* sp. n., du mont Kinangop. × 120.

Edéage (fig. 5) allongé, peu à peu rétréci dans sa partie distale. Styles lamelleux, droits, en contact sur la ligne médiane, leur sommet dilaté et tronqué. Capsule basale atténuée en pointe au dessus des styles ; pas de pièces copulatrices. Orifice basal de la capsule encadré par deux apophyses saillantes en dehors et visibles de haut.

Espèce très isolée dans le sous-genre *Trissemus* s. str. Le rapprochement des carénules basales du premier tergite est le même que chez les *Trissemidius* ; mais l'espèce est de bien plus grande taille que les *Trissemidius* et présente un édéage tout différent, qui d'ailleurs ne peut être comparé à aucun autre connu dans le genre.

Kenya Colony : Mont Kinangop (type), chaîne de l'Aberdare, 2 ex., iii.1930 (*H. J. A. Turner*).

Trissemus (s. str.) *elgonicus* Jeannel.

Jeannel, 1954, *Rev. franç. Ent.* **21** : 164 ; type : Mont Elgon.

Kenya Colony : Kabete, alt. 5800 ft., xii.1928 (*Maclones*).

Espèce voisine de l'*abyssinicus* Raffray, se retrouvant dans le Ruanda.

Trissemus (s. str.) *decipiens* Raffray.

Raffray, 1896, *Rev. Ent. Caen* **14** : 212 ; type : Zanzibar.

Kenya Colony : Naivasha, 1 ♀, vii.1937 (*H. J. A. Turner*).
L'espèce n'était connue que de l'Ile de Zanzibar.

Trissemus (s. str.) *nitidicollis* Jeannel.

Jeannel, 1950, *Ann. Mus. Congo Belge* (Ser. 8°) (Zool.) **2** 97 ; type : Kaenye. 1952, *loc. cit.* (Zool.) **11** : 186.

Kenya Colony : Nairobi, 3 ex., viii.1926 (*A. F. J. Gedye*) ; Kabete, alt. 5800 ft., 3 ex., xii.1938 (*Maclones*).
Espèce voisine du *chappuisi* Jeannel, très abondant et parthénogénétique dans les forêts du Mont Elgon. La forme bisexuée *nitidicollis* Jeannel est répandue au pied de la Dorsale Congolaise, au dessous de 2000 m., dans le Kivu et l'Ituri.
Les exemplaires du Kenya sont plus grands que ceux du Kivu, mais l'édéage est identique.

Trissemus (s. str.) *obtusus* Raffray, 1877.

Jeannel, 1949, *Mém. Mus. Hist. nat. Paris* **29** : 107.

Soudan : Kagabils (Geili), 1 ♂, à la lumière, xi.1929 (*H. W. Bedford*).
Espèce répandue en Abyssinie dans la région chaude du Samarh ; connue encore de Djibouti. La subsp. *arambourgi* Jeannel occupe la basse vallée de l'Omo, en Ethiopie méridionale.

Trissemus (s. str.) *cupulifer* Jeannel.

Jeannel, 1955, *Ann. Mus. Congo Belge* (Ser. 8°) (Zool.) **36** : 68 ; type : Ruanda.

Kenya Colony : Kabete, alt. 5800 ft., 2 ex., xii.1938 (*Maclones*).
Espèce découverte par P. Basilewsky dans les savanes du Ruanda.

Trissemus (*Corynecerus*) *nigricornis* Raffray.

Raffray, 1913, *Voy. Alluaud Jeannel Afr. or.*, Pselaphides : 48 ; type : forêt de Nairobi.
Jeannel, 1949, *Mém. Mus. Hist. nat. Paris*, **29** : 112.

Kenya Colony : Kabete, alt. 5800 ft., 2 ex., xii.1938 (*Maclones*).

Subfam. Pselaphitae, s. str.

Pselaphidius sudanicus sp. n.

Long. 1·6 mm. Ailé. Testacé rougeâtre luisant. Voisin de l'*acuminatus* Motschulsky de l'Europe orientale, mais ayant tout à fait l'aspect d'un *Pselaphus heisei* Herbst, dont il ne diffère guère que par la structure de la massette palpaire et le plus grand élargissement de l'arrière-corps. Tête comme chez *Ps. heisei*, avec les yeux un peu plus saillants ; mêmes ocelles globuleux. Antennes semblables. Palpes maxillaires courts, plus courts que chez n'importe quel autre *Pselaphidius*, le renflement de la massette épais, plus long que son pédoncule comme chez *Ps. heisei*, mais lisse, non épineux et avec un fort sillon canaliculé sur la face externe, caractéristique du genre *Pselaphidius* Jeannel. Pronotum

comme chez le *Ps. heisei*. Arrière-corps plus élargi et déprimé ; les élytres longs avec une grande frange membraneuse blanchâtre sur le bord apical. Plaque tergale presque deux fois aussi large que longue. Pattes courtes.

Espèce assez voisine du *Ps. acuminatus* Motschulsky, de l'Europe orientale et du Liban, mais différente par sa forme plus courte et plus large, sa massette palpaire bien plus renflée. Le *Pselaphidius elgonicus* Jeannel du Mont Elgon est bien plus étroit et allongé que l'*acuminatus* et le *sudanicus*.

Holotype ♀, SOUDAN : dans le Darfur, sans doute à la lumière, vii.1930 (*A. P. G. Michelmore*).

Pselaphoxys delicatulus Raffray.

Raffray, 1882, *Rev. Ent. Caen* **1** : 11. Type : Tanadeglié.

SUDAN : Kagabils (Geili), 1 ex., à la lumière, xi.1929 (*H. W. Bedford*).

Ctenistes imitator Reitter, 1882.

Jeannel, 1949, *Mém. Mus. Hist. nat. Paris* **29** : 187.

KENYA COLONY : Nairobi, 6 ex. (*A. F. J. Gedye*).

Espèce très largement répandue dans les savanes de toute l'Afrique intertropicale.

Enoptostomus formicarius Raffray.

Raffray, 1877, *Rev. Mag. Zool.* 1877 : 282 ; type : Mont Aladjé.

SUDAN : Khartoum, 1 ex., à la lumière, viii.1927 (*H. W. Bedford*).

Tmesiphorites quadrispina Jeannel.

Jeannel, 1951, *Publ. cult. Comp. Diam. Angola*, **9** : 120 ; type : Dundo. 1953, *Ann. Mus. Congo Belge* (Sér. 8°) (Zool.) **20** : 300.

SUDAN : Lobi, 1 ♀, en forêt d'arbres fleuris, ii.1933 (*Miss M. Steele*).

Il est assez curieux de retrouver au Soudan cette espèce décrite du nord de l'Angola. L'exemplaire recueilli par Miss Steele est identique à ceux de l'Angola, qui ont été découverts dans l'humus de plusieurs galeries forestières autour de Dundo.

Centrophthalmosis zanzibaricus Jeannel.

Jeannel, *Mém. Mus. Hist. nat. Paris* **29** : 220 ; type : Zanzibar.

KENYA COLONY : Athi Falls, 1 ex., dans du fumier d'Hippopotame, vii.1937 (*A. F. J. Gedye*).

Différent des exemplaires de l'île de Zanzibar par sa taille un peu plus grande (1 : 6 au lieu de 1 : 4 mm.).

A KEY TO THE ALATAE VIVIPARAE OF *UNIPTERUS* HALL (HOMOPTERA: APHIDIDAE) AND DESCRIPTIONS OF SOME NEW SPECIES.

By V. F. Eastop, Ph.D., F.R.E.S.

(*East African Agriculture & Forestry Research Organisation.*)

Three new species and a new sub-species are here described. The adults of these species, as of all the previously described species, normally have a first tarsal chaetotaxy of 9 : 9 : 9. All the first instar larvae of *Unipterus* seen by the author have a first tarsal chaetotaxy of 2 : 2 : 2. The types of the new species described here will be deposited in the British Museum (Natural History). Thanks are due to Mr. J. P. Doncaster for the loan of a slide of his *U. commiphorae* several years ago and for the opportunity to examine the *Unipterus* material in the British Museum, to Dr. D. Hille Ris Lambers for an opinion on the status of *U. commiphorae persimilis* subsp. n. and to Dr. B. Verdcourt of the East African Herbarium for identifying many of the host plants. The aphids were collected while the author held a Colonial Research Fellowship.

Key to the Alatae viviparae of *Unipterus* Hall.

1 (2) Processus terminalis two and three-quarters to four and a half times as long as the base of the sixth antennal segment. Fore wing with a large dark spot near the apex (fig. C) and another over vein Cu2. Dark dorsal and lateral abdominal tubercles present. On *Combretum apiculatum* . . . . . **U. nachensis** Eastop

2 (1) Processus terminalis less than two and a half times as long as the base of the sixth segment. Fore wing without a dark spot at apex.

3 (8) Processus terminalis one and three-quarters to two and a half times as long as the base of the sixth antennal segment.

4 (5) Mesothorax and abdominal segments 1 to 3 each with a pair of large black dorsal tubercles (fig. E). Hind femora black at base, widest part and at very apex, pale or dusky in between (fig. G). Third antennal segment pale except at the apex which is dark and with a row of 14 or 15 rhinaria over most of its length. Oblique wing veins not bordered with black (fig. D)

U. sawus sp. n.

5 (4) All dorsal tubercles small, dorsal abdominal tubercles pale. Hind femora uniformly pale or dusky or darkening from base to apex. Third antennal segment with a row of 7 to 15 rhinaria. Cu2 strongly bordered with black. Media of fore wing bordered over its distal half . . . . . **U. commiphorae** *sens. lat.*

6 (7) Third antennal segment usually shorter than, sometimes slightly longer than the fourth (III/IV ratio 0·85 to 1·10, usually 0·9 to 1·0) and bearing 7 to 14, usually 8 to 12 rhinaria. Dorsal abdominal tubercles only rarely visible on eighth tergite, absent from the seventh tergite. On *Commiphora zimmermannii*

U. c. commiphorae

7 (6) Third antennal segment always longer than the fourth (III/IV ratio 1·1 to 1·8, usually 1·2 to 1·5) and bearing 9 to 15, usually 11 to 14, rhinaria. Dorsal abdominal tubercles usually present on both seventh and eighth tergites. On *Commiphora fischeri* **U. commiphorae persimilis** subsp. n

8 (3) Processus terminalis less than one and a half times as long as the base of the sixth antennal segment.

9 (10) Siphunculi black. Dark dorsal and lateral abdominal tubercles present. Cu2 strongly bordered with black. On *Combretum* spp. (*apiculatum* and *gueinzii*) . . . . . **U. papillata** Hall

10 (9) Siphunculi pale. Dorsal abdominal tubercles present or absent, when present pale.

11 (12) Dorsal tubercles absent from both head and abdomen. Cu2 bordered with black, other veins pale except at the very apices. Fore femora little if any thicker than mid femora. On *Terminalia sericea* . . . . . **U. terminaliae** Hall

12 (11) Dorsal tubercles present on both head and abdomen, those on abdomen pale and sometimes inconspicuous, those on head always evident. Fore femur about twice as thick as mid femur.

13 (14) Posterior margin of lateral lobes of mesothorax with a pair of large dark dorsal, heavily imbricated, tubercles, which are more than twice as long as their basal width. Cu2 faintly bordered with brown. Third antennal segment distinctly thicker than fourth and bearing 8 to 14 rhinaria placed in an irregular row (fig. B). Third antennal segment uniformly dusky or the very apex rather darker . . . . . **U. ayari** sp. n.

14 (13) Thoracic tubercles small and inconspicuous. Cu2 not bordered with brown. Third antennal segment only a little thicker than the fourth and bearing 6 to 11 rhinaria placed in a very straight row. Third antennal segment pale on its basal half, dark on its apical half . . . . . **U. ufuasi** sp. n.

Unipterus ayari sp. n.

Alatae viviparae.—A small insect about 1 mm. long. Head with three pairs of dark tubercles, the pair on the frons being about twice as long as broad, the two posterior pairs shorter. Antennae six-segmented, with secondary rhinaria confined to the third segment which is thicker than segments IV to VI and about as long as IV + V. First antennal segment strongly produced at its inner apex (fig. B). Third segment with 8 to 14 transverse oval, ciliated rhinaria placed irregularly over half the circumference of the segment (fig. B). Processus terminalis about equal in length to the base of the sixth antennal segment. Antennal segments I and II, apices of III to V and area round the primary rhinarium of VI dark, the remainder of the antennae dusky. Ultimate rostral segment with two hairs in addition to the apical group and about one and a tenth as long as the second segment of the hind tarsus.

Prothorax with two pairs of pale tubercles, the anterior pair the longer. Praescutum with a pair of small dark tubercles at the anterior apices. Each lateral lobe of mesothorax with two tubercles; the anterior tubercles placed closer together and about equal in size to the anterior prothoracic tubercles; the more posterior tubercles placed further apart, and very large and heavily imbricated. Fore femur about twice as thick as mid femur. Wing venation as in fig. A, all veins dusky but only Cu2 with a dusky border and that only weakly developed. Legs dusky, apices of tibiae and tarsi usually rather darker.

Abdominal segments 1 to 5 each with a pair of pale dorsal tubercles, those of the second and third segments about twice as long as those of the first and fourth segments and about

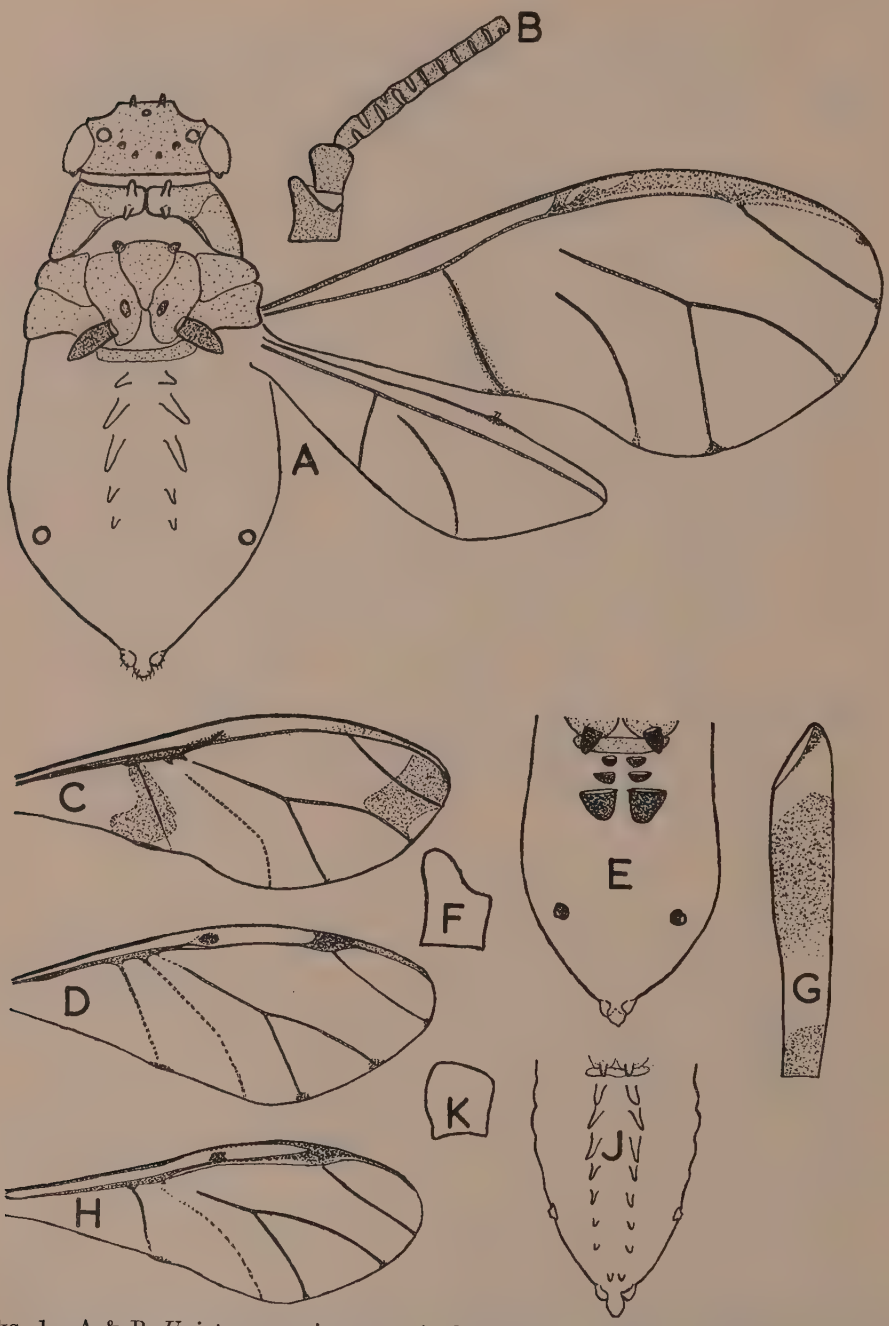


FIG. 1.—A & B, *Unipterus ayari* sp. n.: A, dorsal view; B, right antennal segments I–III. C, wing of *U. nachensis* Eastop. D–G, *U. sawus* sp. n.: D, fore wing; E, posterior part of thorax and abdomen; F, first antennal segment; G, hind femur. H–J, *U. ufuasi* sp. n.: H, fore wing; J, posterior part of thorax and abdomen; K, first antennal segment.

three times as long as those of the fifth tergite. Sixth, seventh and eighth tergites without dorsal tubercles. Lateral abdominal tubercles absent. Siphunculi pale and inconspicuous. Cauda knobbed, anal plate bilobed.

Measurements of alatae viviparae in mm.

	Body length.	Antennal segments. III.	IV.	V.	VI.	Ultimate rostral segment.	Hind tarsus II.	Rhinaria on third antennal segment.
1	0·92	0·18	0·09	0·09	0·07+0·07	0·084	0·076	11/11
2	1·03	0·19	0·12	0·10	0·08+0·08	0·078	0·076	7/8
3	1·01	0·20	0·10	0·11	0·08+0·08	0·084	0·076	9/8
4	0·96	0·21	0·10	0·10	0·08+0·07	0·084	0·076	9/11
5	0·90	0·18	0·10	0·10	0·07+0·08	0·084	0·076	9/10

Data : 1 (Type)–5, trapped at Nachingwea, Tanganyika, February, 1954.
The embryo has pleural in addition to dorsal abdominal tubercles.

Notes.—Host plant unknown. Described from about 65 alatae viviparae trapped at Nachingwea, Southern Province, Tanganyika, in February, 1954; 52 of these specimens were trapped on 15th February. *U. ayari* may be easily recognised by the pair of large dark tubercles arising from the posterior ends of the lateral lobes of the mesothorax.

Unipterus commiphorae Doncaster, 1954.

This species was described from *Commiphora* sp. at Nairobi, where it was collected by Mr. G. de Lotto. Mr. de Lotto kindly took the author to the trees from which the original material was collected, in the grounds of the Scott Agricultural Laboratories at Kabete. The host has been identified by Mr. Verdcourt as *C. zimmermannii* Engl. This aphid has also been collected by the author from the same host growing in the arboretum at Nairobi, and was recorded as *Unipterus* sp. in the *East African Agricultural Journal* (Eastop, 1953).

Unipterus commiphorae persimilis subsp. n.

Alatae viviparae.—Covered with grey wax dust in life (as is *commiphorae* s. str.), in alcohol the body is yellow. Very similar to *commiphorae* s. str., differing most obviously in the ratio between the third and fourth antennal segments. In *commiphorae* s.str. the third segment is usually shorter than the fourth (III/IV ratio 0·85 to 1·10, usually 0·9 to 1·0) and bears 7 to 14 rhinaria, average 9·7 for 197 antennae. In *persimilis* the third antennal segment is always longer than the fourth (III/IV ratio 1·1 to 1·8, usually 1·2 to 1·5) and bears 9 to 15 rhinaria, average 12·3 for 60 antennae. In the specimens examined the secondary rhinaria on the third antennal segment were distributed as follows :

Number of rhinaria on third antennal segment.

	Number of antennae. 6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	Total.
commiphorae	0	3	27	65	53	36	11	1	1	0	0	197
persimilis	0	0	0	3	1	10	14	21	7	4	0	60

The fourth antennal segment of *persimilis* is usually devoid of rhinaria, but rarely 1 or 2 are present. *C. commiphorae* usually has the dorsal abdominal tubercles confined

to the first five tergites; in *persimilis* small tubercles are usually present on tergites 6 to 8, although those on 6 and 7 are often difficult to see. The pale spot at the base of the stigma is usually more obvious and elongate in *persimilis* than in *commiphorae*. Other characters of *persimilis* are as given in the key.

First instar larvae.—Eyes of three facets. Antennae four-segmented. Ultimate rostral segment without any hairs in addition to the apical group. First tarsal chaetotaxy 2 : 2 : 2. Cauda with 2 hairs.

Males.—Alate, described from two specimens. Similar to the alatae viviparae, but distinct dorsal abdominal tubercles present on tergites 1 to 6 only. Antennae six-segmented, segments III, IV and V with numerous secondary rhinaria, VI without secondary rhinaria.

Host plant: *Commiphora fischeri* Engl.

Notes.—Known only from Nachingwea, Southern Province, Tanganyika, where the type specimen was collected on 16.ii.54.

Unipterus nachensis Eastop, 1955.

Known only from Nachingwea, Tanganyika, where it was collected on *Combretum apiculatum* Sond. It differs from all other known *Unipterus* by the great length of the processus terminalis and by the presence of a large dark mark at the apex of the fore wing (fig. C). The type specimen of this species has been lost and, since it has probably been destroyed, a lectotype has been selected—an alata vivipara trapped only about fifty yards from the tree on which the original type specimen was found, and taken at about the same date as the original type. The lectotype will be deposited in the British Museum.

Unipterus papillata Hall, 1932.

Originally described from Southern Rhodesia feeding on *Combretum apiculatum* Sond. and subsequently found by the author at Fourteen Falls, Kenya, (Eastop, 1953) on *Combretum guenzii* Sond. and at Nachingwea, Tanganyika. The sexuales have been described by Doncaster (1954). The first instar larvae have eyes of three facets, antennae of four segments, first tarsal chaetotaxy 2 : 2 : 2, and 2 caudal hairs. Pleural tubercles are present on the abdomen of the first instar larvae in addition to the spinal and lateral series which are present also in the adult.

Unipterus sawus sp. n.

Alatae viviparae.—Head with a well developed pair of tubercles on the frons and with two pairs of well developed dorsal tubercles placed more posteriorly. Antennae thin, about three-quarters as long as the body, the third segment little thicker than the succeeding segments and bearing 14 or 15 strongly transverse rhinaria placed in a straight row. First antennal segment strongly produced at its inner anterior margin (fig. F). First antennal segment, apices of segments III to V and the area round the primary rhinarium on VI dark, second segment and apical half of processus terminalis dusky, remainder of antennae yellow. Processus terminalis about twice as long as base of sixth antennal segment. Ultimate rostral segment shorter than second segment of hind tarsus and with only two hairs in addition to the apical group. Pigmentation of fore wing as in fig. D, hind wing with only one oblique vein and that only very faintly indicated. Anterior femora very thick, more than two and a half times as thick as mid femur. Hind femora characteristically pigmented (fig. G).

Lateral lobes of mesothorax and abdominal segments 1 to 3 with large dark dorsal tubercles (fig. E), the pair on segment 3 being much the largest, about as high as the length of the base of the sixth antennal segment: segments 4 to 8 with small, pale tubercles. Lateral abdominal tubercles absent or very weakly developed. Siphunculi black.

Measurements of the type specimen : Body length 1·35 mm.; antennae, III, 0·34; IV, 0·20; V, 0·18; VI, 0·12 + 0·25. Ultimate rostral segment 0·08; hind tarsus II, 0·10.

Notes.—Described from a single specimen (the type) trapped at Nachingwea, Southern Province, Tanganyika, February to March, 1954. The dorsal tubercles and the pigmentation of the hind femora are characteristic.

Unipterus terminaliae Hall, 1932.

The type of the genus is included in the key from the original description from Southern Rhodesia, where the host was *Terminalia sericea* Burch. A single specimen of what may be this species has been trapped at Muguga, Kenya. It differs from Doncaster's 1954 description of *terminaliae* in that the ultimate rostral segment is only about two-thirds as long as the second segment of the hind tarsus.

Unipterus ufuasi sp. n.

Alatae viviparae.—Head with a pair of tubercles on the frons and two more posterior pairs. Antennae six-segmented, the third segment little thicker than the succeeding segments and bearing six to eleven transverse oval rhinaria. First, second, base of third, base of fourth antennal segment and processus terminalis dusky. Apical half of third, fourth, fifth and base of sixth antennal segment dark. Fifth antennal segment may be uniformly dark or basal half may be only dusky. Processus terminalis from one and a sixth to one and two-fifths as long as base of sixth antennal segment. Antennae from about two-thirds to three-quarters as long as body. Ultimate rostral segment from four-fifths to nearly as long as second segment of hind tarsus, with two hairs in addition to the apical group. Dorsal thoracic and abdominal tubercles pale, abdominal tubercles present on all segments (fig. J), those on anterior abdominal segments the longest, where they are about equal in length to the ultimate rostral segment. Wing veins not bordered, the hind wing with two only slightly indicated oblique veins. Fore femora about twice as thick as mid femora. Siphunculi pale, truncate and inconspicuous.

Measurements of alatae viviparae in mm.

	Body length.	Antennal segments. III.	IV.	V.	VI.	Rhinaria on third antennal segment.	Ultimate rostral segment.	Hind tarsus II.
1	1·22	0·29	0·19	0·18	0·11+0·14	9/11	0·08	0·09
2	1·42	0·30	0·21	0·19	0·12+0·16	8/9	0·09	0·10
3	1·22	0·26	0·20	0·18	0·12+0·14	11/9	0·08	0·09
4	1·28	0·31	0·23	0·19	0·12+0·17	8/8	0·08	0·10
5	1·29	0·24	0·18	0·16	0·10+0·12	8/6	0·08	0·09

Data : 1 (type)–5, trapped, Nachingwea, Tanganyika, February–March, 1954.

Notes.—Described from six alatae viviparae trapped at Nachingwea, Southern Province, Tanganyika, during February and March 1954. General appear-

ance nearest to *terminaliae*, but differs in the presence of dorsal tubercles, thickened fore femora and in that vein Cu2 is not bordered with black.

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